Periodic Bathymetry Survey Report

June 2010 Multibeam Survey

October 2010

623700

Prepared for:
Cooperating Parties Group
New Jersey

Document No.: 60145884.C300

CV10016

Contents

List of Figures

List of Attachments

1. Hydrographic Survey Report For Spring 2010 Lower Passaic River Newark, NJ prepared by Gahagan & Bryant Associates, Inc (GBA).

2. Bathymetric Survey Field Report: Site Visit Summary of Findings June 8-11, 2010 And June 23, 2010, Lower Passaic River, Newark, NJ prepared by AECOM.

3. Review of Hydrographic Survey Report prepared by Gahagan & Bryant Associates, Inc (GBA) for Spring 2010, Lower Passaic River, Newark, NJ, submitted September 30, 2010 prepared by AECOM.

Introduction

The 2010 Bathymetric Survey was performed under the specifications of the "Quality Assurance Project Plan (QAPP) for Lower Passaic River Restoration Project: Periodic Bathymetric Surveys, Revision 2 (May 2010). This survey is the third in a series of periodic mulltibeam bathymetric surveys performed by the Cooperating Parties Group (CPG) as part of the Lower Passaic River Remedial Investigation (RI) and Feasibility Study (FS). The survey was performed by Gahagan & Bryant Associates, Inc (GBA) between June 8-23, 2010 accordance with the specifications of the USEPA-approved QAPP. The survey (Figure 1) was conducted in the river miles 0 to 14 of the Lower Passaic River Study Area (LPRSA). GBA conducted the two previous multibeam surveys in 2007 and 2008 over the same extent of the LPRSA. AECOM performed oversight on behalf of the CPG during the 2010 survey and reviewed the report submittal. CDM provided oversight on behalf of the USEPA.

The 2010 Bathymetric Survey was performed by the CPG at the direction of USEPA to address the following study questions identified by USEPA:

"Can morphologic features (e.g. depositional bars, deep channels) be identified as stable or unstable after large events?

- By examining existing persistent morphologic features (e.g. depositional bars, deep channels, smooth channels) in 2007 and 2008 surveys, the 2010 survey can yield deviations from these persistent features after a large event.
- Large scale bed roughness features on the order of 0.5 m or more, due to macro organic material, trees, sand waves, other debris, could either be removed or formed during large events. Comparison of the 2008 and 2010 surveys could yield both quantitative and qualitative information on these features.

Where are possible depositional areas located in the LPRSA after a large event?

- Formation of large scale depositional features either in-channel or on point bars due to increased sediment loads during large events is a possibility. These features would be readily identified in the 2010 survey.

Can unstable areas of sediments after a large event be identified?

- Large persistent linear channelized features are evident in the 2007 and 2008 surveys in the vicinity of the pilot dredging region. Changes or formation of such features during a large event would be evidence of scouring. The size and magnitude of these features can be compared in order to better inform the quantification of sediment stability in the river."

The precision and accuracy of the data were collected consistent with Engineering and Design - Hydrographic Surveying (EM 1110-2-1003; US Army Corps of Engineers 2002 [modified 2004]). The raw and processed data have been reviewed to ensure that the requirements of the USEPA-approved QAPP have been met. The data collected during this survey meets the data quality objectives to address the above study questions, with consideration to the uncertainty inherent in these data and specified in the QAPP. Specifically, depth difference maps produced with this survey and previous bathymetric surveys provide qualitative comparisons only, and depth

differences of ±0.3 m are within the range of uncertainty and should be removed from evaluation and considered in all interpretations of these data (See Worksheet #9 of the QAPP for additional detail on data use objectives).

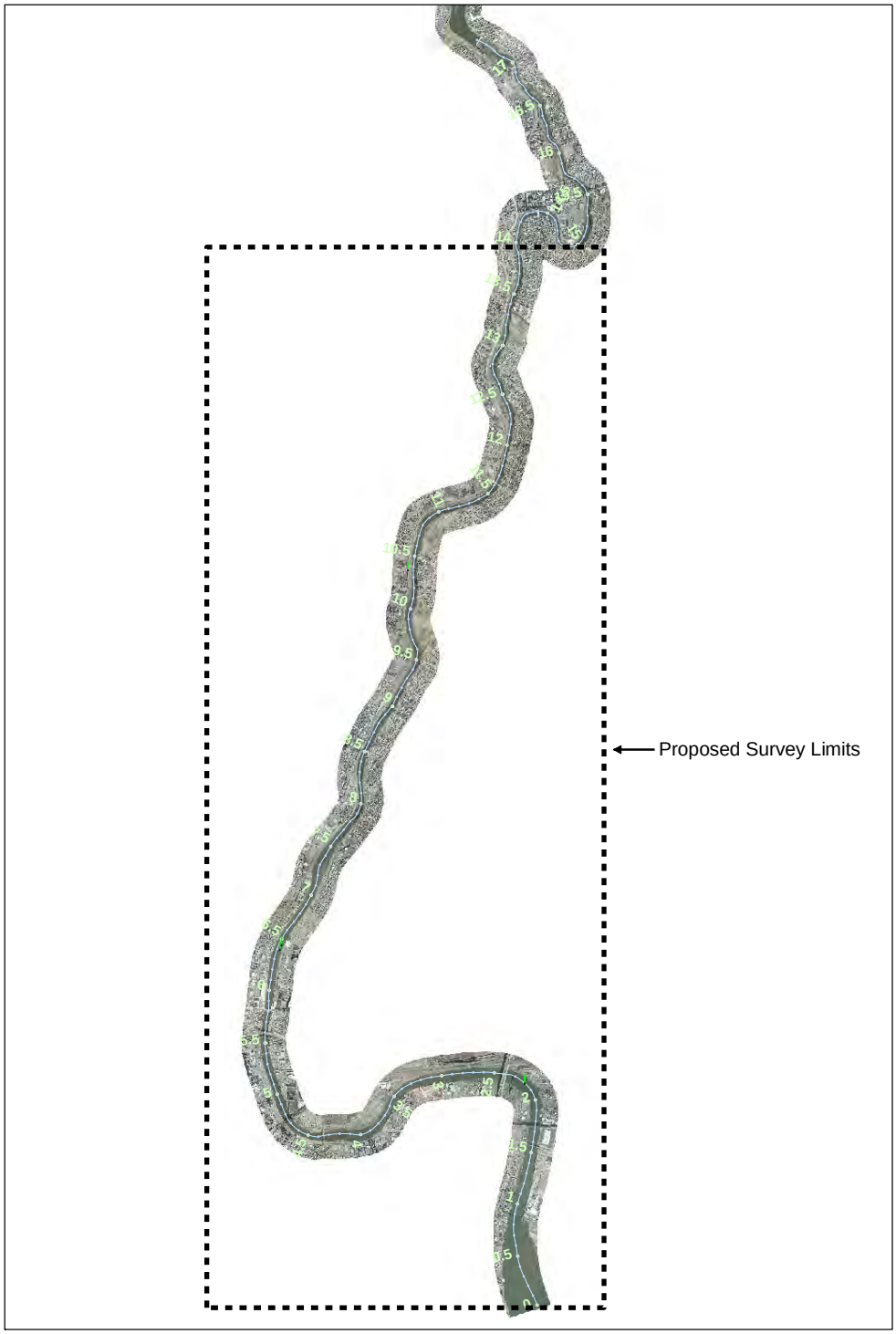
No interpretations of the survey results are included in this report and its attachments. Data analysis and interpretation of this survey as well as its relationship to other surveys will be conducted as part of the LPRSA CSM development, sediment stability analyses, Lower Passaic River/Newark Bay Modeling Program, and other components of the LPRSA RI/FS.

The following documents are attached:

1. Hydrographic Survey Report For Spring 2010 Lower Passaic River Newark, NJ prepared by Gahagan & Bryant Associates, Inc (GBA).

2. Bathymetric Survey Field Report: Site Visit Summary of Findings June 8-11, 2010 And June 23, 2010, Lower Passaic River, Newark, NJ prepared by AECOM.

3. Review of Hydrographic Survey Report prepared by Gahagan & Bryant Associates, Inc (GBA) for Spring 2010, Lower Passaic River, Newark, NJ, submitted September 30, 2010 prepared by AECOM.



0 6,000 12,000 Feet

Periodic Bathymetric Survey
Lower Passaic River Restoration Project
Proposed Multi-beam Survey Limits

! **Control Points for 2007 Bathy Survey**

J:\Water\ProjectFiles\P120\12182_Passaic\Data\GIS\Maps\2008_MultiBathy.mxd

AECOM
May 2010

References

AECOM 2010. Quality Assurance Project Plan for Lower Passaic River Restoration Project: Periodic Bathymetric Surveys, Revision 2. AECOM, Inc. , May 2010.

HYDROGRAPHIC SURVEY REPORT

FOR

Spring 2010

Lower Passaic River

Newark, NJ

Submitted:

October 19, 2010

Prepared by:

Gahagan & Bryant Associates, Inc.
5803-D Kennett Pike, Centreville Square
Wilmington, Delaware 19807

TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

Gahagan & Bryant Associates (GBA) has performed two previous hydrographic surveys of the Lower Passaic River in September 2007 and November 2008. The high flow event of March 2010 prompted the EPA to request an additional multibeam survey of the lower 14 River Miles of the Passaic River. This survey was performed with the same methodologies as the previous two surveys.

2.0 SURVEY SETUP AND CONTROL

On June 5, 2010, four vertical control points were recovered and/or situated at various points along both sides of the Passaic River by GBA survey technicians. Tide gauges were set near these control points for the purpose of providing daily QA/QC checks of the accuracy of RTK derived water surface elevations used to provide real-time tide corrections during the hydrographic survey.

Static GPS observations were made on the ground control points utilizing four Ashtech Locus L1 receivers. In addition, four control monuments listed in the National Geodetic Survey (NGS) database were observed to establish the horizontal and vertical positions of the site benchmarks.

Listed hereafter are the NGS control monuments used in this survey. The values shown are NAD 83 (horizontal) and NAVD 88 (vertical).

NGS PID	NAME	LAT	LON	ELEV	H/V
AI7796	01392590 A	N 40°43'58.61588"	W 074°09'13.731 44	11.67'	H/V
KV3414	G101	N 40°47'49.60797"	W 074°08'17.21832"	14 .24'	H/V
KV6837	9 C 1	N 40°39'46.13811"	W 074°07'56.83589"		H
	188.12-A*			188.47'	V

NOTE 188.12-A is a MAG Nail Set near KV0135, designated as "188.12 NJGS". A closed level loop was performed between KV0135 and the MAG Nail. GPS observations were performed from 188.12-A.)*

The project control, NAD 83 & NAVD 88 values and descriptions are listed as follows:

NAME	NORTHING	EASTING	ELEV.	DESCRIPTION
01392590 A	692097.663	588059.003	11.670	AI7796 Steel Rod
G101	715490.263	592312.818	14.240	KV3414 Disk
9 C 1	666572.729	594085.074	7.202	KV6837 Disk
188.12-A	732846.821	606378.233	188.470	MNS NEAR 188.12 NJGS
PORT 1	695188.398	597847.469	8.961	Sheared Metal Bolt
PATH	701845.995	585643.039	5.705	PSE&G Disk "PRO4"
NUTLEY 2	720714.538	592028.699	7.952	TPS NEAR NUTLEY
CPG2	733825.441	597109.293	7.936	TPS NEAR CPG1

Tide gauges were established via closed level runs from the static GPS control points. The NGS VERTCON program was utilized in adjusting the NAVD 88 vertical values to NGVD 29 datum. The tide gauges and values are listed as follows:

GAUGE	NAVD 88 ELEV	NGVD 29 ELEV	DESCRIPTION
PORT 2	8.89'	10.01'	Mark on SE corner of concrete
PATH 3	6.11'	7.23'	Triangle cut on concrete wall ES of river
NUTLEY	8.73'	9.85'	Mark on conc. Wall on WS of river
CPG1	8.18'	9.30'	Triangle cut on top of steel bulkhead

3.0 HYDROGRAPHIC SURVEY

All work conducted during the hydrographic survey was performed in accordance with the Quality Assurance Project Plan (QAPP) for Lower Passiac River Restoration Project: Periodic Bathymetric Surveys, Revision 2 (AECOM, May 2010).

Multi-beam Survey

GBA performed a multi-beam survey that extended from the mouth of the Lower Passaic River at RM 0.0 to RM 14, which is the upriver limit of effective multi-beam coverage. The multi-beam survey covered the main channel prism and all depths greater than (-) 6.0 feet NGVD, residing within the confines of the riverbanks. GBA's survey maintained a buffer of approx. 75 feet around all bridges and in-water structures, as these areas were covered in the Fall 2007 survey. GBA planned and conducted our survey lines and data collection to ensure 100% bottom coverage. We primarily used only the multi-beam survey data collected within the confines of the primary 90 degree cone (nadir to 45 degrees both port and starboard) for the processing of final survey results and deliverables. In shallow areas (less than 10 feet) there were small data gaps due to the shallow water depth. GBA made every effort to minimize the data gaps. Sufficient data were collected to clearly define 0.5 foot contour intervals. GBA met all requirements outlined within the Corps of Engineers Hydrographic Survey Manual EM 1110-2-1003, dated January 1, 2002 as augmented by April 1, 2004 updates to Chapter 11 for multi-beam surveying. GBA met standards for multi-beam surveys conducted for Navigation and Dredging Support Surveys in soft bottom materials.

Single Beam Survey

GBA surveyed the thirteen (13) selected transects as surveyed during the Fall 2008 survey event. These transects extended from RM 1.6 to RM 8.0 and met all requirements outlined within the Corps of Engineers Hydrographic Survey Manual.

Survey Equipment
GBA utilized equipment identical to the equipment used on the 2007 and 2008 surveys and included the following components:

Multi-beam equipment

1. · The Multi-beam data collection system consisted of a Reson 8101 SeaBat system operating at +/- 240 kHz, with a total beam angle of 210 degrees. Each individual beam angle measures 1.5 degrees X 1.5 degrees. The 8101 was upgraded to include Reson's backscatter and side scan software options. The Reson's 8101 transmitter and receiver (transducer) is permanently mounted on a bow deployable arm, designed by GBA to best suit the shallow draft requirement of this project plus ensure the stability of the transducer

2. Primary horizontal and vertical positioning was accomplished by utilizing a Trimble DSM232 RTK rover/receiver with a CDMA cell phone modem. RTK corrections were obtained via the CDMA modem from a permanent CORS (Continuously Operating Reference System) site located at the New Jersey Institute of Technology (NJIT) in Newark, NJ. See attached specifics on the NJIT site and Station Description for NJI2, which is the NGS control point utilized for the NJIT CORS site. This method of positioning was chosen in lieu of establishing our own transmitting base stations at numerous control points due to the security issue and also it allowed us to spend more time collecting multi-beam data. GBA also utilized the aforementioned positioning methods, as it replicated the 2007 and 2008 surveys. . The NJIT CORS Station and the DSM232 was used for all horizontal and vertical positioning, included water surface elevations/tide.

3. GBA utilized the most recent version of Hypack/Hysweep (2010) for data collection and editing and collect and process all data on high speed PC-based data collection platforms.

4. Inertial Positioning was accomplished by utilizing an Applanix – TSS POSMV.

5. Heave/pitch/roll/yaw compensation was accomplished with the TSS POSMV.

6. The method for determining water surface elevations (tide levels) was the same methodology used on the Fall 2007 and Fall 2008 surveys. Analog visual tide gauges were set at the same tidal gauging locations used for the 2007 and 2008 Fall surveys. Control information for these points were re-confirmed with Static GPS prior to the commencement of the hydrographic survey. Real time tides were obtained by using GPS in the RTK mode and these RTK elevations were checked and verified and compared to the analog tide gauges numerous times during the course of a survey day to ensure the accuracy required is met or exceeded.

7. ·The survey vessel Sea Fix is a 25 foot aluminum hulled vessel constructed by Thomas Marine in 1997. It is powered by twin 175 HP outboard motors with an onboard power generating system to operate the survey equipment. This is the same vessel that was utilized on the 2007 and 2008 surveys.

Single beam equipment

1. GBA utilized an Odom Mark III operating at 200/33 kHz (+/- 10 %) with a 3.5 degree beam angle transducer.

2. GPS positioning equipment were the same as item 2 above for multi-beam positioning.

3. Data collection system and software were identical to the systems identified in item 3 above.

4. Water surface/tide elevations were obtained utilizing the same methods described in paragraph 6 above.

For the Spring 2010 survey, both the multi-beam and single beam surveys were conducted from the same vessel.

4.0 DATA PROCESSING AND COLLECTION

GBA made all efforts to ensure that the multi-beam data collected provided100% bottom coverage. This was the case the majority of the time, but shallow water depths was the limiting factor on some of the survey lines and 100% overlap was not possible in the shallower depths as referenced in GBA's initial proposal and subsequent conversations with Ms. Greenblatt.

Multi-beam survey deliverables

Deliverables from the Multi-beam survey shall include:

1. Report documenting how the survey was performed, what equipment was used, who performed the survey, how data was processed and how QC requirements were met.

A. Report documenting how the survey was performed.

The majority of the information in reference to the conduct of the survey is embedded within other portions of GBA's submission. Please see Equipment List, Overview of Multi-beam Daily Survey Reports and Overview of Quality Control and Quality Assurance Procedures.

A brief overview is as follows:
GBA installed the Reson 8101 on the Sea Fix at our Baltimore Office and performed pre-mobilization system checks between June 1-4, 2010, GBA survey team departed for the Passaic River on June 5, 2010. Multi-beam patch testing

and QA/QC test were initiated immediately. Survey lines were established based upon channel coordinates to best obtain 200% bottom coverage.
The multi-beam survey commenced on June 9, 2010 and concluded on June 23, 2010.

B. Equipment used: Please see Equipment List

C. Who performed the survey: Please see below

The primary field survey team consisted of:

Mr. Edward DeAngelo, Scientist/Survey Manager/Lead Project Surveyor
Please see attached resume for Mr. DeAngelo
Mr. Travis Schmidt, USCG Licensed Vessel Captain
Mr. William Carroll, PLS MD/DE/VA/WV/PA
Mr. Paul Seaboldt, PLS NY/CA
Mr. Blair Carlson, PE Washington Survey Technician

Office data processing personnel:
Mr. Edward DeAngelo, See above
Mr. John Drake, GBA Engineer and CAD Specialist
Ms. Jayne McClure, GBA Engineer and Multi-beam Processing Specialist
Project Manager: Douglas Moore, PLS/ACSM Certified Hydrographer – Survey Division Manager

D. How data was processed and how QC requirements were met

QC/QA for all GBA survey projects commence immediately upon receipt of surveying contract. Preliminary QC/QA procedures for the 2010 Passaic River Project were the same used during the 2007 and 2008 surveys. The procedures were provided to all field and office personnel involved with the project on May 24, and updated on June 3, 2010 . These procedures were primary in our ongoing data collection and review process for the project. All procedures outlined in the August 22, 2007 Overview of Quality Control and Quality Assurance Procedures for the Passaic River Multi-beam Survey were followed and performed during the conduct of the survey.
Please see the following pages in reference to our preliminary and ongoing QC/QA efforts.

GAHAGAN & BRYANT UPDATED QUALITY CONTROL/QUALITY ASSURANCE OVERVIEW

PASSAIC RIVER MULTI-BEAM SURVEY-MAY/ JUNE/JULY 2010

The intent of this document is to provide minimum performance standards to conduct the multi-beam and single beam surveys generated and proposed by GBA on the Lower Passaic River during the period referenced above.
GBA shall follow and meet all requirements as indicated within the confines of the U.S. Army Corps of Engineers Hydrographic Survey Manual EM 1110-2-1113, dated January 1, 2002 and as augmented by updates to Chapter 11 Multi-beam Surveying for Navigation and Dredging Support Surveys for Soft Bottom Materials.

Additional QC/QA procedures shall be implemented if required during the conduct of the survey if conditions warrant.

TASKS TO BE PERFORMED AT BALTIMORE'S GBA OFFICE BEFORE MOBILIZATION

- ***Mechanically prepare vessel, trailer and tow vehicle***
- ***Inspect all resident required safety equipment and ensure operational status***

SURVEY RELATED PROCEDURES

- ***Verify operational status of all survey related equipment, including software and hardware***
- ***Verify offsets of all surveying equipment***
- ***Measure and verify plate check and bar check lines***
- ***Perform internal calibration test bucket test) on Sound Velocity Profiler***
- ***Verify acoustic constants on both single beam and multi-beam transducers***
- ***Ensure 210 degree 8101 head is onboard and all beams are functional, including backscatter***
- ***Perform latency test on single beam system***
- ***Verify static draft index marks are visible for daily static draft visual tests***
- ***Perform Patch Test***
- ***Conduct full Performance Test, as outlined within the Corps Hydro Manual – Chapter 11***

  Strive to obtain results commensurate with Hard Bottom standards, although our Proposal references Soft Bottom Standards

See the following criteria:

Hard Bottom : Max. allowable bias = <0.1 feet Maximum outlier = 1.0 feet

Soft Bottom: Max. allowable bias = < 0.2 feet Maximum outlier = 1.0 feet

PRELIMINARY ONSITE QC/QA PERFORMANCE CHECKS

The following tasks shall be performed onsite prior to the commencement of any survey related tasks on the Lower Passaic River, either single beam or multi-beam.

- ***Patch Test***
- ***Performance Test***

  Performance Tests shall be conducted prior to, at the half way point of the collection of survey data and at the conclusion of the field survey data collection process(Total of a minimum of 3 Performance Tests).The results shall minimally meet Soft Bottom Standards while striving to meet Hard Bottom Standards. If feasible, all Performance Tests shall be conducted in an area provided by the NYD Corps Engineers. This area is constantly utilized by the Corps for their QC/QA Performance Tests and is modeled very accurately. If it is not possible to use the Corps Site, an additional area shall be selected to meet project requirements.

  NOTE: All Performance Tests conducted for both multi-beam and single beam shall be initially conducted using the CORS network corrections. Additionally, the same lines shall be re-run in both single beam and multi-beam mode using the GBA RTK base station set on verified control. This procedure shall be repeated each time a Performance Test is performed to document the quality of the corrections over the time period of the survey.

- ***All existing horizontal and vertical control that was utilized on previous surveys (2007 & 2008) shall be verified for status and published x/y/z values shall be compared to real time values obtained by RTK methods utilizing CORS corrections from NJIT Base Station. Check in observations shall be observed on multiple monuments using both GBA RTK and CORS systems and values compared to each system including previously determined X/Y/Z values.***

  Static observations shall be made on a specific control point by both systems for approx. 15 to 30 minutes and results compared. Additional control shall be utilized and or established as required to meet survey standards.

- ***Any additional QC/QA procedures as deemed appropriate by the Survey Project Manager.***
- ***ALL PROCEDURES AND THE RESULTS THERE OF SHALL BE CLEARELY DOCUMENTED IN HARD COPY AND DIGITAL FORMAT.***

DAILY QC/QA PROCEDURES

NOTE: DAILY SURVEY QC/QA PROCEDURES SHALL FOLLOW MANDATES IN CORPS HYDROGRAPHIC SURVEY MANUAL AND SHALL INCLUDE BUT NOT LIMITED TO THE FOLLOWING:

- ***Sound Velocity Profiles at the beginning, midpoint and end of the survey day***

- ***Vertical positioning checks at the beginning, midpoint and end of the survey day, horizontal positioning checks at the beginning and end of the survey day.***

- ***Sufficient single beam survey lines to augment and verify the multi-beam survey data. It is suggested that these cross lines be surveyed approx. every 1000 feet perpendicular to the channel alignment.***

- ***All survey data shall be uploaded on a daily basis to an independent GBA QC/QA Expert to ensure the validity of the survey data, verify area coverage and provide acceptance of the data collected and generate areas that require additional survey data if necessary.***

ALL QC/QA PROCEDURES, INCLUDING THOSE CONDUCTED IN BALTIMORE, ONSITE PRELIMINARY QC/QA AND DAILY QC/QA CHECKS SHALL BE CLEARLY DOCUMENTED BY THE ONSITE SURVEYOR IN CHARGE FOR FUTURE REFERENCE.
ADDITIONAL ONSITE QC/QA PROCEDURES SHALL BE IMPLEMENTED AS REQUIRED TO ENSURE ACCURACY REQUIREMENTS ARE MET OR EXCEEDED

Additional Field QC/QA Procedures
On a ongoing basis, during or immediately following the conduct of the multi-beam field data collection efforts, the Lead Surveyor on site evaluated the quality of the collected data based upon coverage, overlap, minimum elevation obtained, comparison of depths on overlapping swaths, data gaps, positioning accuracy, comparison of water surface readings (set tide gauges versus RTK GPS) and made immediate onsite decisions as to the accuracy and validity of data and discern if any areas needed to be re-surveyed.

Overview of Office Processing Procedures
The initial processing of the multi-beam data was performed on site, by Mr. DeAngelo to ensure that all accuracy and coverage issues were satisfied. The multi-beam data was then transferred to GBA's Houston Offices for final processing. We utilized the personnel at these offices due to the fact that they are very familiar with multi-beam data collection and post processing and also in order to meet our projected delivery schedule for the multi-beam data.

The raw data was reviewed for obvious outliers and then processed through all phases with Hysweep software. Hypack/Hysweep multibeam processing is broken into three phases. In Phase 1 raw data files are opened and the parameters for the application of ancillary data (motion, tide, speed of sound, etc) is defined. At this stage the tide values that applied to each raw can be reviewed with erroneous RTK spike removed (as under bridges), heave, pitch & roll is reviewed prior to application to sounds, and finally GPS position holidays can be edited out of the database.

In Phase 2 of multibeam data processing or Sweep Editing, ancillary sensor data is applied to the soundings and individual passes of sounding data. Sounding points can be edited manually or by automatic filters based on angle/offset from nadir; Min/Max depth values; and beam quality.

The final phase of multibeam processing is Area Based. During this phase a series of overlapping multibeam are binned to a regularly spaced matrix. In the final phase, overlap of adjacent sweeps are evaluated to ensure that the bottom profiles align correctly. Additional point reduction was performed to remove flyer points based on statistical analysis of the soundings in each cell of a 3ft x3ft matrix. Final data points files were generated from the phase as A) All sounding points, B) Average sounding for 1ft x 1ft matrix, and C) Average sounding for a 3ft x 3ft matrix.

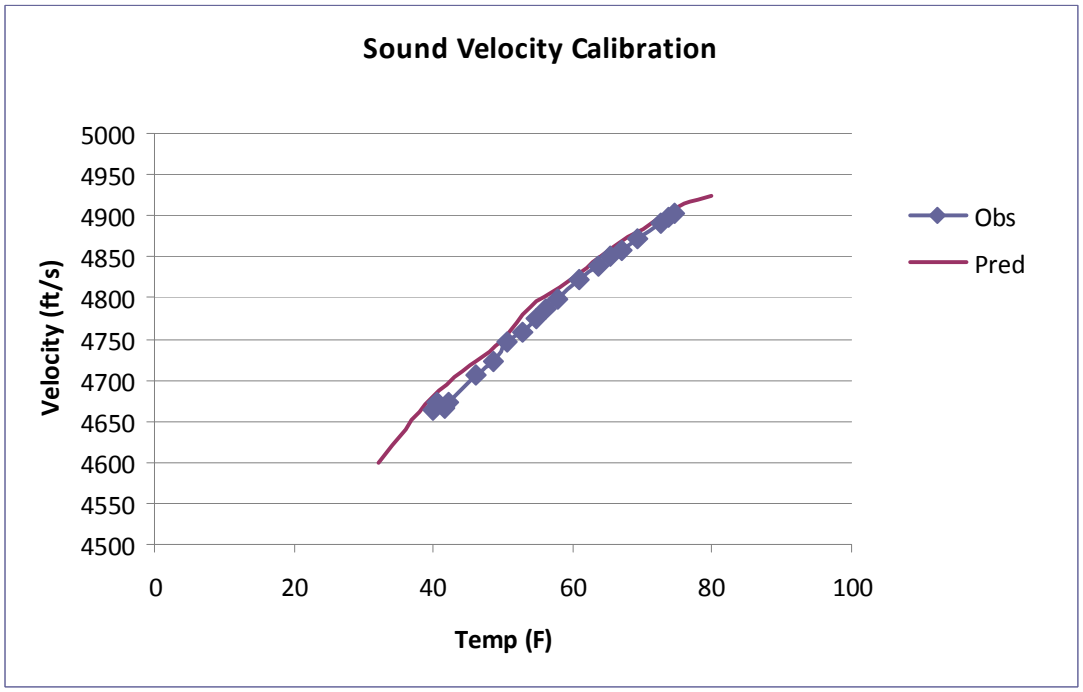
Overlapping swaths were reviewed and compared for coverage, depth repeatability, accuracy and gaps. Field QC processes were reviewed and tide readings compared and applied to the raw data. GBA's initial single beam cross-section surveys were overlaid with the multi-beam data to ensure accuracy of the data sets. Once the multi-beam data was edited and verified it was formulated into final products, such as contours and binned data. Contours were generated at 0.5 ft intervals and are provided in AutoCad DWG files.

5.0 QUALITY CONTROL/QUALITY ASSURANCE

Prior to the start of the Lower Passaic River Spring 2010 hydrographic survey, GBA performed several quality assurance and quality control procedures. In addition to physically verifying all horizontal and vertical offsets for positioning and sounding equipment the survey crew performed a complete systems operation check in Baltimore Harbor prior to mobilization to NJ.

Sound Velocity Profiles

The sound velocity profiler calibration was verified as per the method proscribed in the US Army Corps of Engineers Engineering and Design Manual EM 1110-2-1003. The profiler was set in a distilled -water bath using ice to vary the water temperature. Observed sound velocity measurements and water temperature



Throughout each survey day, GBA surveyors performed several velocity casts to ensure that tidal variation did not significantly effect the sounding data.

RTK Corrections

To ensure the accuracy and precision of the Leica SmartNet RTK corrections that were received from the NJIT CORS station. GBA used Static GPS observations tied to local NGS monuments to confirm the horizontal and vertical positions of control points set by GBA during the 2007 surveys. Using a back pack rover, GBA made RTK point observations at both NGS monuments and GBA set points receiving corrections from not only the NJIT CORS station as a "single-base" setup but also from the Keystone Keynet VRS service as an independent check. All checks were with in tolerances for RTK GPS of +/- 0.5 ft.

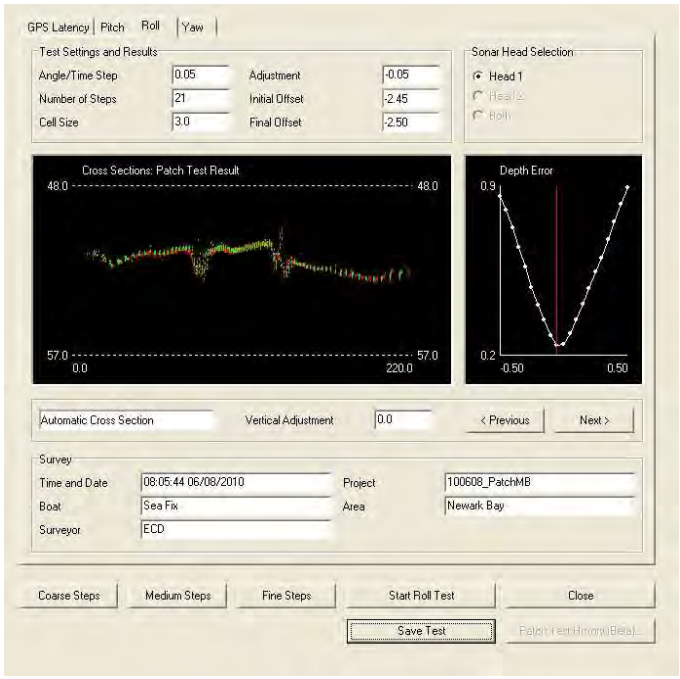
Daily checks of the RTK position system were performed by logging the vessel position at the dock at the beginning and end of each day to ensure no horizontal changes. RTK Tides were checked three times; beginning, middle, end by comparing the computed to RTK Tides to analog tide readings at Port, Path, Nutley, and/or CPG dock. All RTK tides checks agreed with analog readings.

Patch Tests

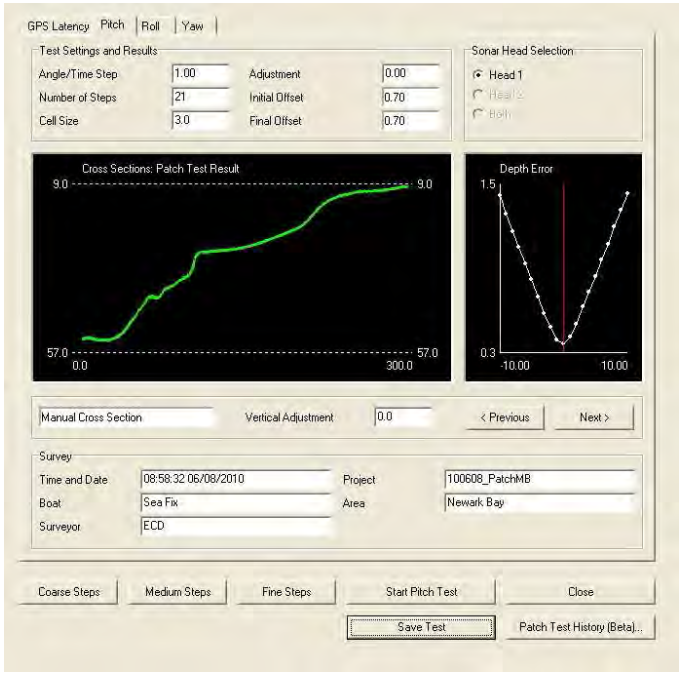
Patch tests; used to determine and correct system bias' for Pitch, Roll, and Yaw, were performed prior to and immediately following the Spring 2010 Hydrographic Survey of the Passaic River. Patch tests were performed in Newark Bay were there was sufficient water depth in the maintained channels for the Roll bias test, and sufficient bottom elevation change/slope to perform the Pitch, Yaw, and Latency tests. Below are the results from the

Results from the June 8, 2010 Pre Survey Patch Test in Newark Bay

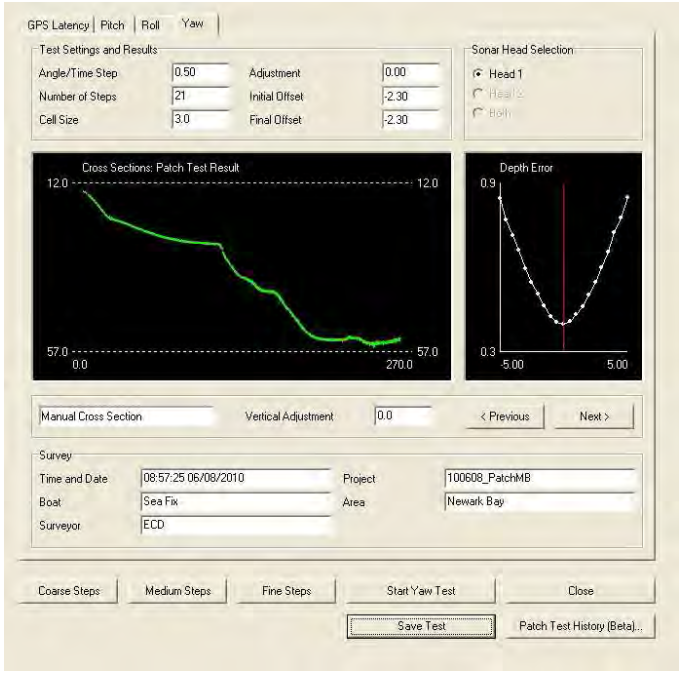
Roll - 6/08/2010



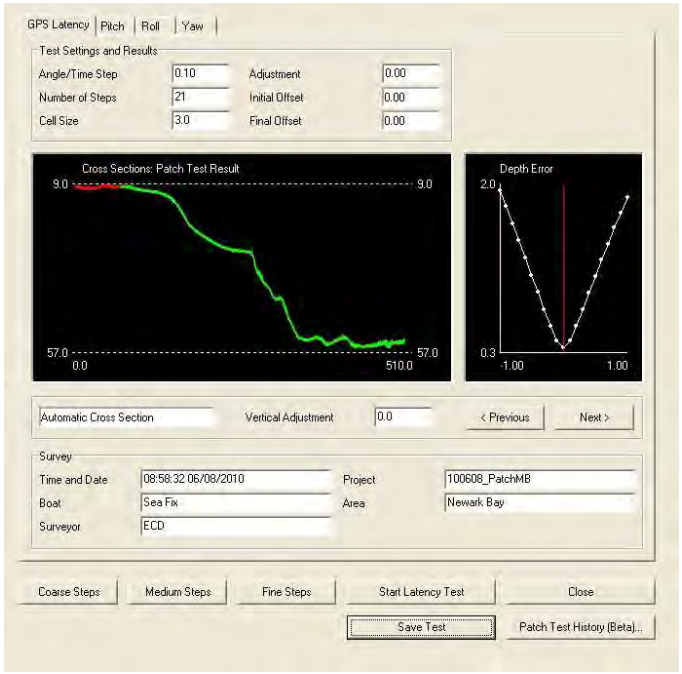
Pitch - 6/08/2010



Yaw - 6/08/2010

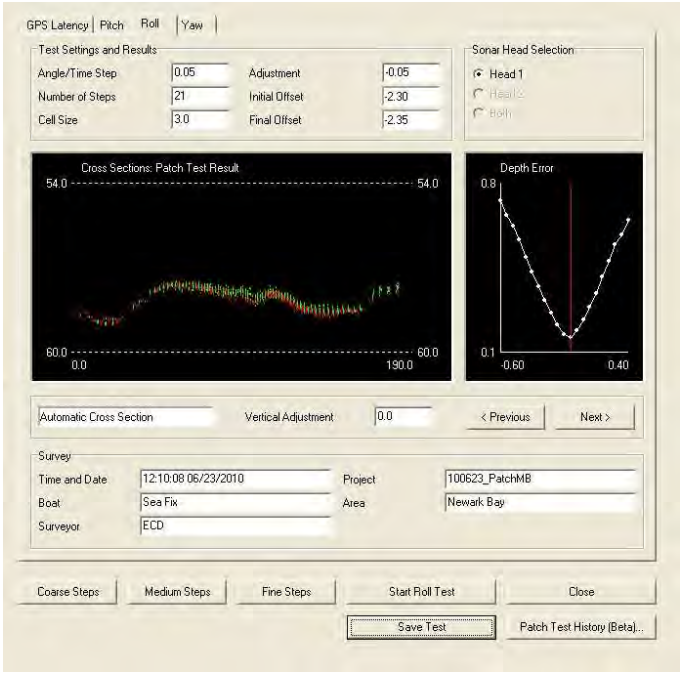


Latency - 6/08/2010

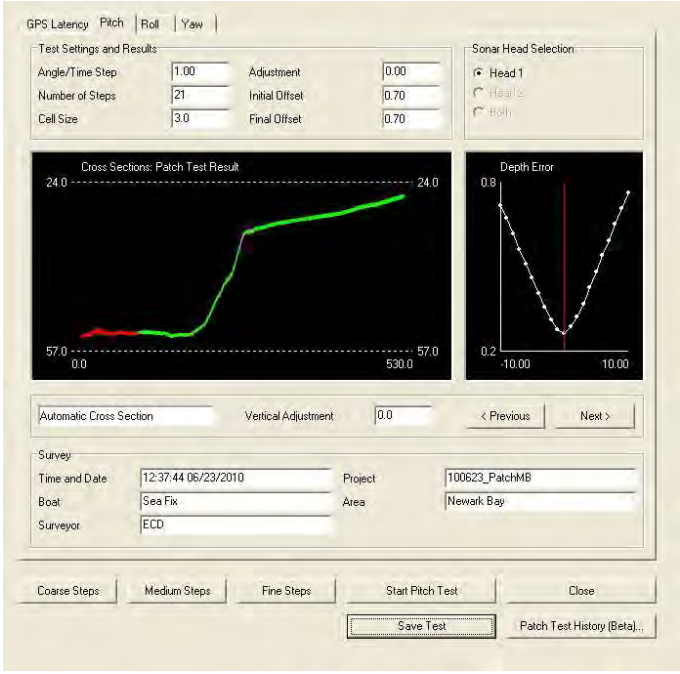


Results from the June 23, 2010 Post Survey Patch Test in Newark Bay

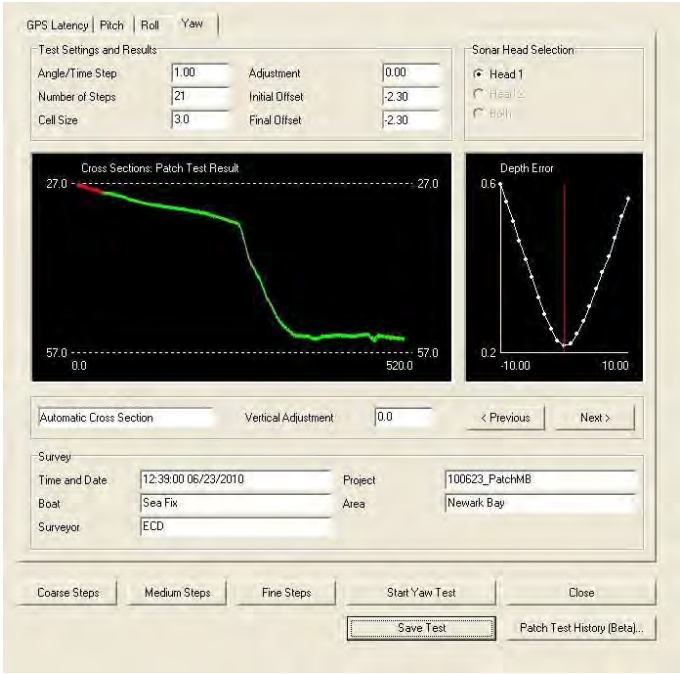
Roll - 6/23/2010



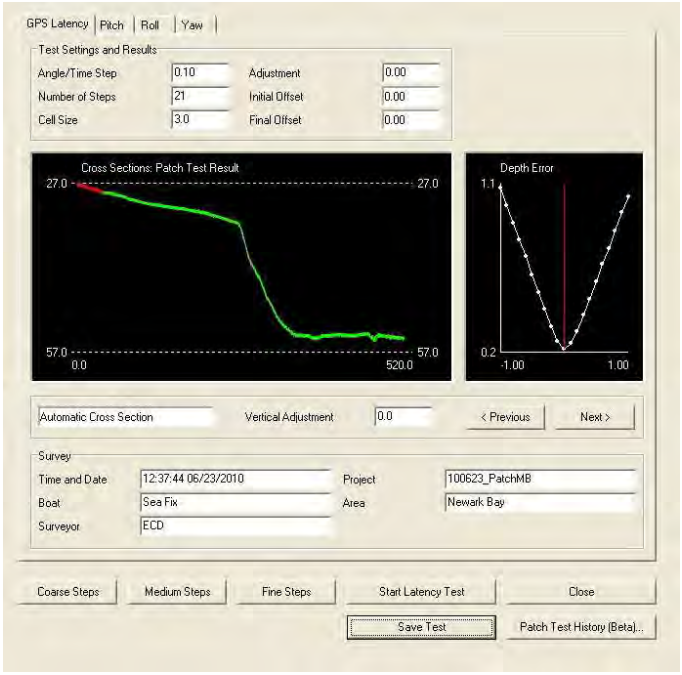
Pitch - 6/23/2010



Yaw - 6/23/2010



Latency - 6/23/2010



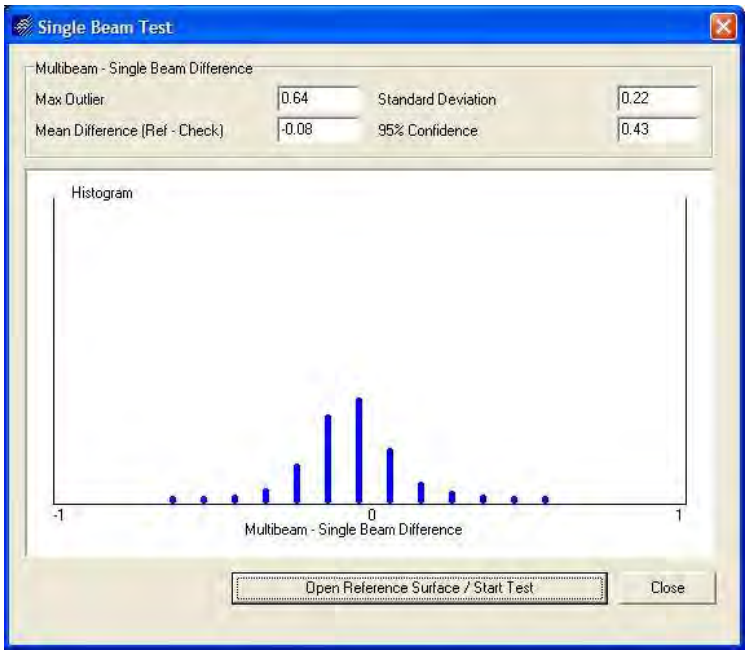
Performance Tests

The mulitbeam performance test consists of two parts: 1) Beam Angle Test and 2) Single Beam test. The Beam Angle Test compares multibeam check lines to a reference surface and estimates the depth accuracy of the multibeam system at different angle limits. The estimated accuracy can be used to determine if the multibeam system meets survey specifications. Similarly, the Single Beam test provides a statistical comparison of single beam cross-sections to a reference multibeam surface

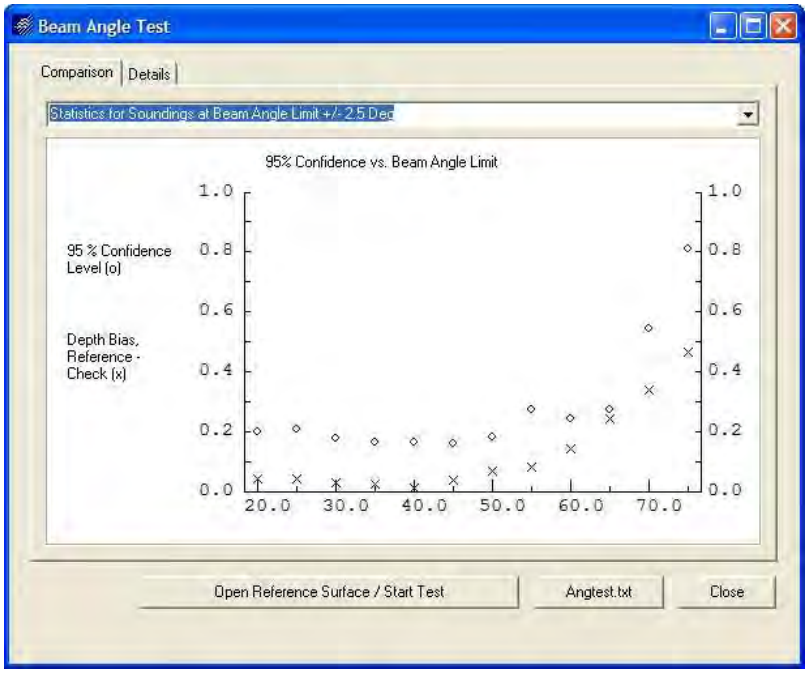
Three Performance tests were performed to document the accuracy of the hydrographic survey system. Tests were done Pprior to survey operations on June 8, 2010, approximately the mid-point of the survey on June 17, 2010 and at the completion of the survey on June 23, 2010. The repeatable results of all the Performance tests show that survey system remained stable in in its accuracy and precision through the course of the survey operations.

June 8 2010 Performance Tests

Singlebeam-Multibeam Performance test

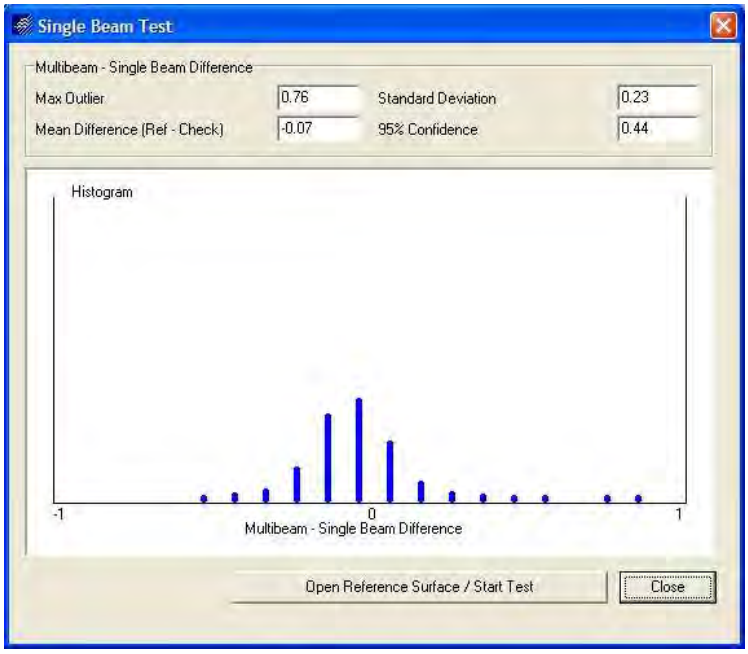


Beam Angle

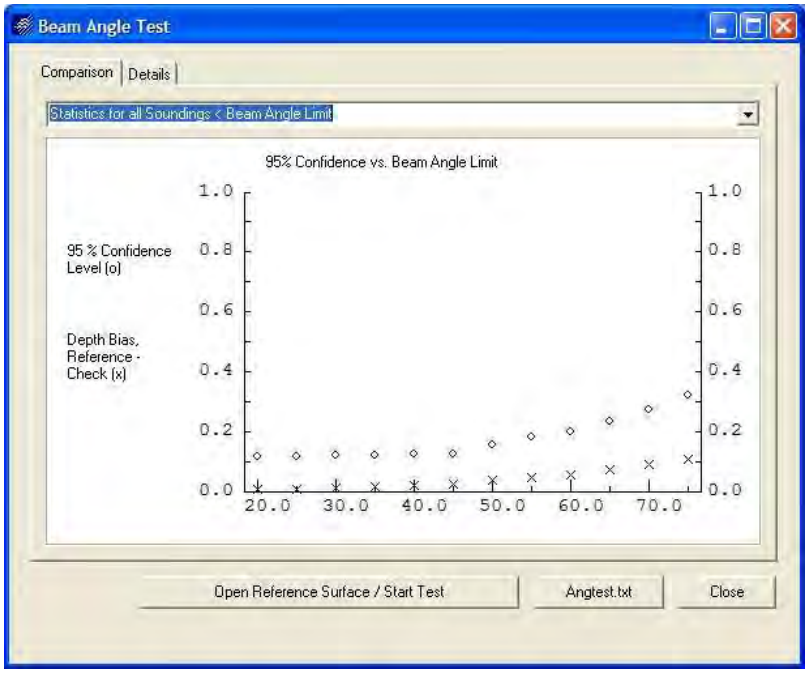


June 17 2010 Performance Tests

Singlebeam-Multibeam Performance test

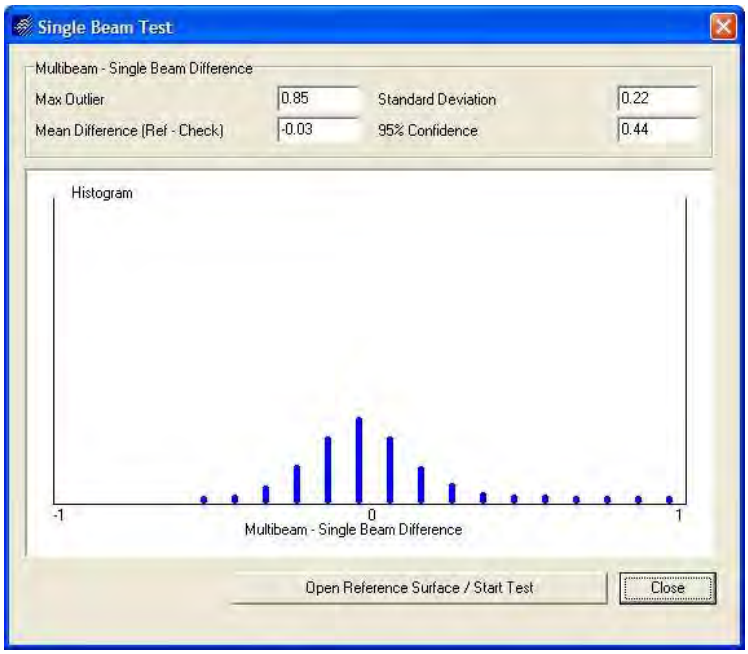


Beam Angle

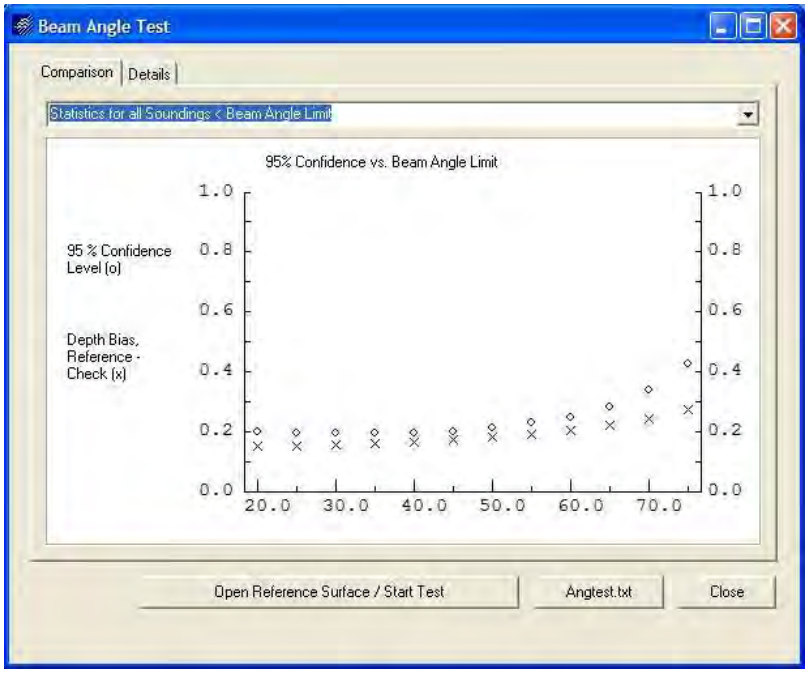


June 23 2010 Performance Tests

Singlebeam-Multibeam Performance test

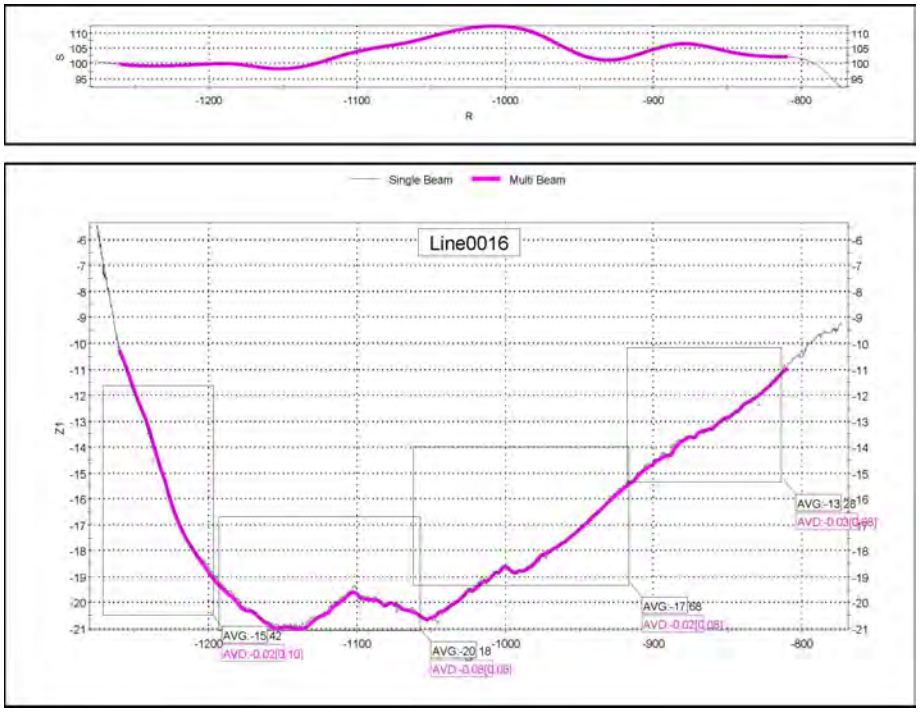


Beam Angle



Single-beam Cross-check Lines

Throughout the course of the survey operations, Gahagan and Bryant collected single beam cross-sections as an checks to compare against multibeam data. Dailey cross check lines spaced at ~500ft intervals and overlain on the multibeam. Below is a typical cross-section showing the consistent correlation between the survey technologies which adds confidence to the 2010 multibeam dataset.



6.0 DAILY OVERVIEW OF SURVEY OPERATIONS

The following information is representative of GBA's Daily Surveying Activities in reference to the multi-beam survey of the Passaic River from mile marker 0 to 14

Week of May 31, 2010
System checks and vessel repairs were performed in Baltimore

June 5, 2010
Survey team, consisting of party chief Ed DeAngelo, USCG Licensed Vessel Captain Travis Schmidt and Surveyor William Carroll mobilized from Baltimore MD to Carteret, New Jersey (4 hours). Survey Vessel SeaFix is launched and moored at the Elizabeth City Marina. Reconnaissance and RTK checks are performed at local NGS monumentation .and GBA established control points from 2007. RTK checks were performed using two independent sources of RTK Corrections: 1) Leica Smartnet (NJIT) used for the 2007 & 2008 surveys; and 2) Keystone KeyNet VRS.

June 6, 2010

GBA performed a series of static GPS sessions .to tie further the horizontal and vertical position for GBA set monuments, Port, Path, Nutley, CPG to local NGS monuments. These control points were used as RTK tide check points through out the survey operations. Mr. Carroll departed to the job site and returned to Maryland to process the Static GPS sessions

June 7, 2010
Mr. Paul Seaboldt joined the survey crew in NJ. Final system calibrations and equipment offsets were confirmed. GBA performed a preliminary Patch Test in Newark Bay to confirm that all survey systems were fully operational.

June 8, 2010
Jason Magalan from Sea Engineering and John Gaskin from AECOM joined the survey team. Final Patch and Performance Tests were conducted in Newark Bay. Additional testing was also done by collecting multi-beam and single beam data in a reference area of the Hudson River that is constantly utilized by the NYD for their QC/QA checks.

June 9, 2010
Final checking of the GBA Trimble GPS systems using corrections from Leica Smartnet service NJIT CORS station was performed at NGS Monument AI7779. A tide board was installed adjacent at RM 2.25 in the vicinity of reference point PORT that will be utilized for daily tide checks during surveys of the lower half of the river. Multi-beam survey operations commenced. Area A01 adjacent to the Hess Oil tank facility at the mouth of the Passaic River was completed

June 10, 2010
Survey data were collected in Areas A02, A03, A04 RM 1.5 was completed on the evening high tide, with shallow water areas on the eastern side of A02 & A03 remaining

June 11, 2010
Jason Magalen departed the survey area this date. Survey data were collected in Areas A02-A07. The shallow ends of Areas A02 & A03 were completed, while center stretches of areas A05, A06, and A07 were surveyed during lower tide levels. Single beam cross-sections 59 and 78 were surveyed this day.

June 12, 2010

John Gaskin departed for Houston. Survey Areas A05-A07 were completed (RM 2.25 complete) while center sections of Areas A08 and B01 were surveyed (underneath the RR Bridge and NJ Turnpike Bridge (RM 2.5). Single beam cross –lines 59, 78, and 104 were surveyed this date.

June 13, 2010
Areas A08, B01 and B02 were completed RM (3.25) and center sections of Area B03 were surveyed (RM 3.4). Single beam cross-sections 104, and 148 were surveyed this date.

June 14, 2010
No surveys were performed on this date for due to mechanical repairs and maintenance.

June 15, 2010
Survey data were collected in Areas B03 thru B06. All areas were completed up the Jackson St Bridge (RM 4.3). Single beam cross-sections 148, 153, 178, and 192 were surveyed this date.

June 16, 2010
Survey data were collected in Areas B07 thru C02. All sections between the Jackson St Bridge and the Bridge St. have been completed (~RM 5.5). Single beam cross-sections 204, and 235 were surveyed this date.

June 17, 2010
Mid Survey Multibeam performance test was conducted in Newark Bay. Survey data were collected in Areas C03 – C08 completing up to RM 7.0.

June 18, 2010
Additional survey data collected underneath the Clay St bridge in Area C04. Areas C09 through D01 . To complete the upper sections of the river, the survey vessel SeaFix was moored at the CPG floating dock on Madison Street, East Rutherford (RM 13)

June 19, 2010
Additional lines were surveyed in Area D01. Areas D02 through D04 (RM 8.6) were completed. During the afternoon high tide, shallow edges of Areas D06 through D09 (~RM 9.7).were surveyed

June 20, 2010
–Completed additional edge in area D05 on the south side of the Bellville Bridge. Survey sections D06 through F01 were completed the Park Ave Bridge (~ RM 10.3)

June 21, 2010
Resurveyed area F01 based on the review of the previous days suggested that multi-pathing GPS returns from adjacent building adversely affected the sounding data. Cleaned up some data caps in E01 and completed Areas F02 through G04

June 22, 2010
Completed surveys of Areas H01 through H09. While performing near shoreline surveys during the evening high tide, the multibeam transducer head bumped a rock projecting from the bottom during a slow speed turn. The bottom profile in the upper reaches of the river were not suitable for a complete patch test, but the Roll compontent was immediately tested by running reciprocal passes in the center of the channel. Based on those results ; a small change in the Roll bias was applied to the system configuration and survey operations resumed. Note* final close patch tests conducted the following day 6/23/10 in Newark Bay confirmed these settings.

June 23, 2010
Mr. John Gaskin from AECOM joined the survey crew this day. They completed the regular survey of by finishing Areas H10 through H12. Additional reference points were observed near AECOM's water level gages at the Myrtle Ave Bridge near RM 13.5 and at the abandoned Rail Road Crossing near RM 1. Additional survey data were collected in A05 and A08 and final Patch and Performance tests were performed in Newark Bay

June 24, 2010
Survey equipment was secured and Survey Crew and vessel demobilized to Baltimore MD

7.0 CONTACT INFORMATION

Gahagan & Bryant Associates, Inc.
5803 Kennett Pike, Suite D
Centerville Square
Wilmington, DE 19807
Office: (302) 652-4948
Fax: (302) 655-9218

Survey Manager:
Douglas Moore email: dcmoore@gba-inc.com

Technical Project Manager:
Edward DeAngelo email: edeangelo@gba-inc.com

APPENDIX 1

Control Monuments

9C1

NGS PID# KV6837
New Jersey Geodetic Survey (NJGS) Disk – stamped 9 C 1 1992
New Jersey State Plane NAD 83 Horizontal Coordinates (feet)
Northing 666,572.73 Easting 594,085.07
Vertical Elevation (Observed)
NAVD 88 = 7.202' NGVD 29 = 7.202'

Situated in the Bayonne, New Jersey City Park, this control monument is located 95.4 feet northwest of the southwesternmost corner of the chainlink fence surrounding the tennis courts. It is further located 8 feet northeast of the edge of a paved parking lot situated on the southern end of the City Park, near Newark Bay. Static GPS observations were performed from here to help establish horizontal positioning for the survey project.

188.12 NJGS

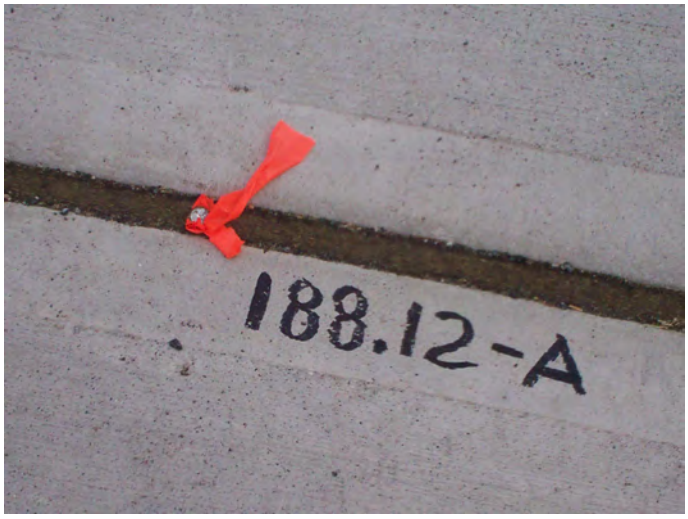
NGS PID# KV0135
Chiseled Cross in marble sill
New Jersey State Plane NAD 83 Horizontal Coordinates (feet) ***SCALED***
Northing 732799 Easting 606324
Vertical Elevation
NAVD 88 = 187.48' NGVD 29 = 188.50'

Situated in Woodridge, New Jersey, this control point is a chiseled cross on top of a marble sill of a basement window found along the southeasternmost side of the Mount Pleasant School building, located at the southwest corner of the intersection of Union and Hackensack Streets. A closed level loop was run from this point to 188.12A for Static GPS observations.

188.12-A

Locally Set Control Point
MAG Nail Set
New Jersey State Plane NAD 83 Horizontal Coordinates (feet)
Northing 732846.821 Easting 606378.233
Vertical Elevation (Observed)
NAVD 88 = 188.470' NGVD 29 = 188.49'

Situated in Woodridge, New Jersey, this control point is a MAG Nail set in the expansion joint of a 7' wide concrete sidewalk along the southeast side of Humboldt Avenue. It is located directly across the street from the Woodridge Fire Department and is measured 55.8' southwest of utility pole #60667-WB. It is further measured 68.9' northeast from an unidentified utility pole. A closed level loop was run to this point from 188.12 NJGS to establish a vertical control for static GPS observations.



01392590 A (AI7796)

NGS PID# AI7796
New Jersey Geodetic Survey (NJGS) Cover – stamped 01392590 1997 (steel rod in casing)
New Jersey State Plane NAD 83 Horizontal Coordinates (feet)
Northing 692,097.66 Easting 588,059.00
Vertical Elevation
NAVD 88 = 11.67' NGVD 29 = 12.78'

Situated in the city of Newark, New Jersey, this control point is a steel rod buried in the ground and encased with a lid as stamped above. The marker is located on the east side of Raymond Avenue at the intersection of Van Buren Street. It is measured 32' northeasterly from a light pole and 21' southeasterly from a concrete wall situated on the east side of a concrete walk leading northerly along the exit ramp from Raymond Avenue. Static GPS observations were made from this point to establish horizontal and vertical positioning for the survey project.

CPG

Locally Set Control Point
Triangle carved on top of steel bulkhead
Vertical Elevation (Observed)
NAVD 88 = 8.18’ NGVD 29 = 9.19’

Situated in Wallington, New Jersey, this control point is a triangle chiseled into the top of a steel bulkhead along the east side of the Passaic River. The bulkhead is located on the west side of a parking lot for a business center located on the west side of Madison Street. The mark is measured 17.3’ northerly from a light pole and is adjacent to a floating dock. A closed level loop was run from CPG2, situated just north of this point, where static GPS observations were made.

CPG2

Locally Set Control Point
MAG Nail Set
New Jersey State Plane NAD 83 Horizontal Coordinates (feet)
Northing 733825.441 Easting 597109.293
Vertical Elevation (Observed)
NAVD 88 = 7.936' NGVD 29 = 8.950'

Situated in Wallington, New Jersey, this control point is a MAG Nail set into asphalt near a steel bulkhead along the east side of the Passaic River. The bulkhead is located on the west side of a parking lot for a business center located on the west side of Madison Street. The mark is measured 8.6' northerly from a light pole and is situated along the west side of a guard rail Static GPS observations were made at this point and a closed level loop was run to control point CPG situated just south of this location.

G101

NGS PID# KV3414
National Geodetic Survey (NGS) Disk – stamped G 101 1979
New Jersey State Plane NAD 83 Horizontal Coordinates (feet)
Northing 715490.263 Easting 592312.818
Vertical Elevation
NAVD 88 = 14.24' NGVD 29 = 15.29'

Situated in North Arlington, New Jersey, this control monument is located along the southeast side of River Road in the front yard of house #352. It is further located 2.0' southwest of the southwesternmost side of an asphalt driveway leading to house #354. The mark is measured 6.7' east of utility pole #A60351 NA and 12.2' northwest of the guy anchor attached to the pole. Static GPS observations were made from this point to establish horizontal and vertical positioning for the survey project.

Nutley

Locally Set Control Point
Mark at edge of Concrete Wall
Vertical Elevation (Observed)
NAVD 88 = 8.73’ NGVD 29 = 9.77’

Situated in Nutley, New Jersey, this control point is a mark chiseled on top of a concrete wall along the eastern edge as it abuts the west side of the Passaic River. The concrete wall is situated along the west side of a parking area for a boat ramp. Boat Ramp is located just north of Park Avenue where it connects with the Kingsland Avenue Bridge leading to the east side of the river. A closed level loop was run from Nutley2, situated south of this point, where static GPS observations were made.

Nutley 2

Locally Set Control Point
Capped Iron Pin Set
New Jersey State Plane NAD 83 Horizontal Coordinates (feet)
Northing 720714.538 Easting 592028.699
Vertical Elevation (Observed)
NAVD 88 = 7.952' NGVD 29 = 8.992'

Situated in Nutley, New Jersey, this control point is a capped iron pin set in a gravel parking lot and boat ramp situated along the west side of the Passaic River. Boat Ramp is located just north of Park Avenue where it connects to the Kingsland Avenue Bridge leading to the east side of the river. The point is located 3' westerly from the west edge of a concrete wall along the river and 3' northwesterly of a concrete curb. Static GPS observations were made at this point and a closed level loop was run to control point Nutley situated just north of this position.

Path

PSE & G Disk – stamped PRO 4 (Passaic River Outfall #4)
New Jersey State Plane NAD 83 Horizontal Coordinates (feet)
Northing 701845.995 Easting 585643.039
Vertical Elevation (Observed)
NAVD 88 = 5.705’ NGVD 29 = 6.791’

Situated in Kearney, New Jersey, this control point is a PSE & G control disk embedded in a concrete flume leading westward from a parking lot into the east side of the Passaic River. The parking lot is situated south of a PathMark grocery store located along the west side of Passaic Avenue. The point is measured 7’0’ northerly from the south edge of the concrete flume and 3.5’ easterly from a guard rail. Static GPS observations were made here and a closed level loop was run to PATH 3 situated north of this position.

Path 3

Locally Set Control Point
Triangle cut chiseled on top of concrete bulkhead
Vertical Elevation (Observed)
NAVD 88 = 6.105’ NGVD 29 = 7.191’

Situated in Kearney, New Jersey, this control point is a triangle cut chiseled into the top of a concrete bulkhead situated along the east side of the Passaic River. The mark is located to the rear of a PathMark grocery store located on the west side of Passaic Avenue and is measured 35’ northeasterly of a large cleat and 20’ southwesterly of another large cleat. It is further measured 14.5’ northwesterly of the westernmost corner of a storm drain.

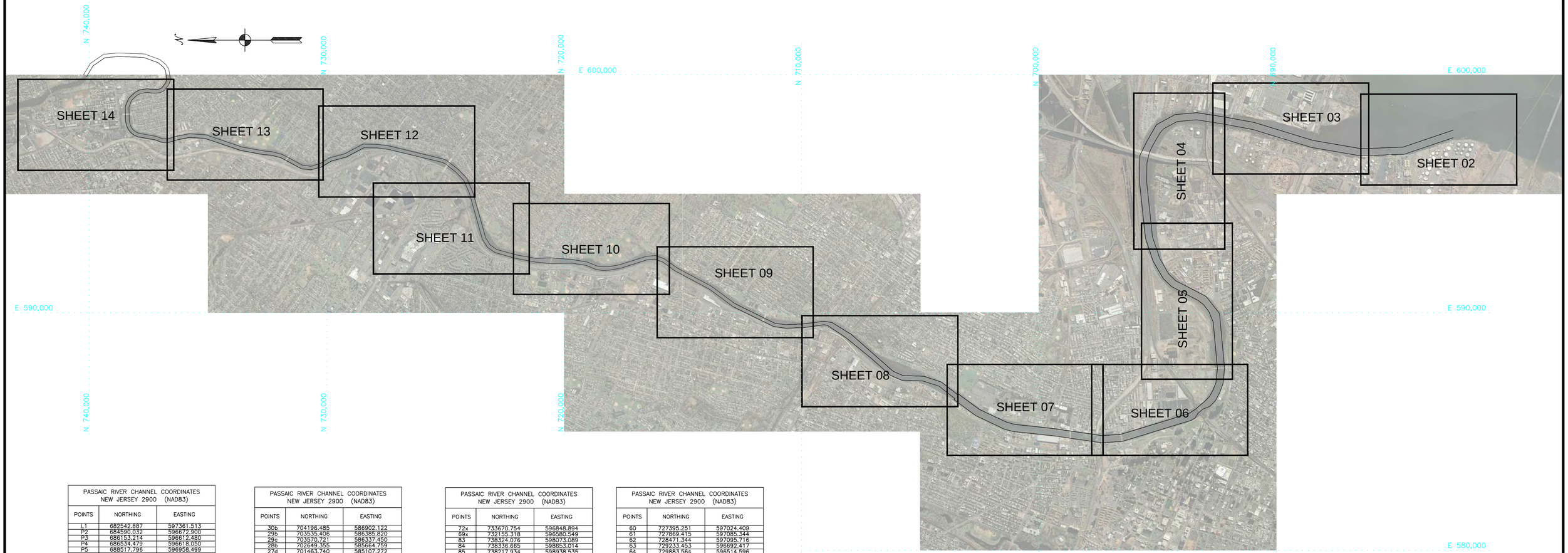
Port1

Locally Set Control Point
Sheared Metal Bolt
New Jersey State Plane NAD 83 Horizontal Coordinates (feet)
Northing 720714.538 Easting 592028.699
Vertical Elevation (Observed)
NAVD 88 = 8.96' NGVD 29 = 10.08'

Situated near Kearney, New Jersey, this control point is a sheared metal bolt located on a concrete dauphin situated in the Passaic River west of a New York-New Jersey Shipping Authority facility located at the westernmost end of Pennsylvania Avenue. It is measured 6.6' northeast of the southwest side of the dauphin. It is further measured 5.3 feet northwest of the southeast side of the dauphin. Static GPD observations were made here and a closed level loop was run to Port2 situated along the southeasternmost edge of the dauphin.

APPENDIX 2

0.5ft Contour plots of Multibeam Data



PASSAIC RIVER CHANNEL COORDINATES NEW JERSEY 2900 (NAD83)		
POINTS	NORTHING	EASTING
L1	682542.887	597361.513
P2	684590.032	596672.900
P3	686153.214	596612.480
P4	686534.479	596618.050
P5	688517.796	596958.499
1A	690982.349	597710.661
L2	682533.543	597681.146
S2	684644.754	596970.983
S3	686156.819	596912.537
S4	686506.746	596917.650
S5	688448.365	597250.941
5c	690910.916	598002.492
6c	692220.027	598245.986
7	693351.681	598417.051
8	694256.342	598336.009
9	695039.548	597919.516
10	695446.436	597207.736
11	695741.718	596621.285
12	695750.454	595469.021
13	695507.670	593138.941
14	695183.223	592168.401
15new	694755.021	591428.294
15a	694407.610	591095.796
16c	693279.203	590513.991
16a	693052.604	590327.812
17c	692828.831	590046.095
17a	692650.726	589601.402
18	692473.444	587650.574
18b	692172.128	587649.390
17b	692382.719	589966.756
16b2	692951.112	590682.327
15c	694231.561	591342.524
15d	694516.760	591615.482
14b2	694908.360	592292.324
13b	695212.727	593202.799
12b	695450.364	595483.472
11c	695444.181	596298.984
11a	695329.867	596772.228
10b	695182.076	597065.749
9a	694733.869	597742.319
8b	694169.105	598042.649
7b	693360.847	598115.056
2a	692269.886	597950.142
19	692530.765	587070.412
20	692651.280	586749.897
21	692802.987	586474.247
23	693692.635	585745.200
24	696542.551	584876.981
25	697350.452	584828.042
26	699351.781	585117.775
27c	701027.173	585296.576
27a	701358.763	585389.391
28	702495.693	585923.986
29	703393.838	586579.723
29a	703417.422	586547.419
30	704101.239	587081.482
31	704847.519	587321.246
31b	704882.551	587124.380

PASSAIC RIVER CHANNEL COORDINATES NEW JERSEY 2900 (NAD83)		
POINTS	NORTHING	EASTING
30b	704196.485	586902.122
29b	703535.406	586385.820
29c	703570.721	586337.450
28b	702649.355	585664.759
27d	701463.740	585107.272
27e	701083.910	585000.954
26b	699389.199	584820.091
25b	697383.002	584526.758
24b	696489.036	584579.699
23b	693565.378	585470.383
21b	692560.228	586293.195
20b	692378.086	586624.145
19b	692236.119	587001.711
32	705723.717	587354.325
33	706145.567	587536.429
34	707947.745	589132.861
34a	707958.669	589119.803
35	708709.886	589584.829
36	709048.052	589640.225
37	709870.310	589530.674
38	710645.885	589493.328
39	711131.038	589560.242
40	712811.013	590385.769
41	713791.993	591108.369
41b	713872.363	590981.285
40b	712889.182	590257.064
39b	711175.483	589414.866
38b	710652.581	589342.844
37b	709856.774	589381.165
36b	709050.320	589488.610
35a	708903.215	589464.512
34b	708114.608	588943.994
33a	707003.330	588029.103
33b	706254.212	587365.509
32b	705768.419	587155.802
U1	695148.721	597728.538
U2	694888.297	597579.665
21A	693003.099	586271.353
22A	693410.915	585926.416
23C	693408.204	585571.485
23D	693297.666	585760.281
21D	693080.084	585944.315
21C	692799.038	586051.065
101b	740121.286	599929.871
101	740250.294	600006.378
100b	739849.961	600387.393
100	739962.037	600492.449
99	739403.421	600874.556
99b	739350.713	600728.890
98b	738794.278	600781.592
98	738798.594	600931.841
97	737683.849	600890.587
96	737033.296	600657.790
95	736772.744	600438.733
94	736652.194	600249.150
75b	736323.472	597271.287
74b	735791.335	597378.271
73x	735135.471	597338.616

PASSAIC RIVER CHANNEL COORDINATES NEW JERSEY 2900 (NAD83)		
POINTS	NORTHING	EASTING
72x	733670.754	596848.894
69x	732155.318	596580.549
83	738324.076	598073.089
84	738336.665	598653.014
85	738217.934	598938.535
86	737988.914	599154.542
87	737849.232	599225.160
88	737579.468	599271.344
89	737314.355	599237.523
90	737029.410	599258.280
91	736859.642	599338.731
92	736655.365	599594.251
93	736590.942	599799.382
97b	737712.558	600741.560
96b	737109.195	600525.649
95b	736886.928	600338.780
94b	736796.378	600196.378
93b	736744.079	599812.349
92b	736790.049	599665.979
91b	736955.168	599459.439
90b	737058.288	599405.853
89b	737310.273	599388.205
88b	737582.704	599422.959
87b	737886.775	599186.191
86b	738076.000	599278.580
85b	738344.133	599025.682
84b	738487.303	598681.391
83b	738473.636	598051.838
69	732134.113	596729.783
72	733599.937	596933.365
73	735106.673	597487.135
74	735801.764	597529.162
75	736351.229	597416.585
67	731022.018	596202.665
68	731873.857	596665.924
68x	731928.455	596524.884
67b	731067.293	596056.555
66b	730656.096	596014.098
65b	730221.437	596134.888
64b	729823.820	596375.442
63b	729177.922	596552.109
62	728435.319	596945.086
61b	727880.299	596935.522
60b	727422.499	596876.690
59d	725121.453	596520.874
59e	725014.969	596269.648
58b	724565.994	595921.367
57b	724253.168	595585.761
42	715240.587	591886.532
43	715782.428	592273.957
44	716157.003	592402.187
50	719665.540	592235.728
51	720551.577	592303.624
52	721191.290	592283.660
55	723303.636	593146.827
56	723843.197	595054.081
57	724095.927	595649.880
58	724465.520	596033.250

PASSAIC RIVER CHANNEL COORDINATES NEW JERSEY 2900 (NAD83)		
POINTS	NORTHING	EASTING
60	727395.251	597024.409
61	727869.415	597085.344
62	728471.344	597095.716
63	729233.453	596692.417
64	729883.564	596514.596
65	730281.446	596273.882
66	730668.917	596166.207
59c	724935.611	596397.910
59a	725070.771	596462.932
56b	723984.955	595004.185
51a	720606.352	592071.417
50b	719683.076	592086.545
49b	719065.702	591988.471
45b	716504.004	592223.076
44b	716175.921	592250.131
43b	715851.792	592139.141
42b	715320.018	591758.943
52b	721202.501	592133.250
75w	736648.133	597167.386
77w	736931.419	597171.325
78w	737239.883	597279.578
79w	737958.155	597405.842
80w	738104.726	597468.383
81w	738233.502	597561.686
82w	738337.880	597681.911
83w	738412.497	597822.555
75e	736678.390	597315.184
77e	736897.061	597318.225
78e	737201.813	597425.173
79e	737915.317	597550.598
80e	738030.368	597599.438
81e	738131.463	597672.938
82e	738213.405	597767.320
83e	738271.983	597877.732
70a	732614.977	596800.940
69a	732324.898	596776.601
A9	718742.251	592015.159
45a	716533.276	592371.158
A4	717654.648	592014.384
A3	718099.679	591937.994
A2	718370.096	591928.682
49a	719024.259	592133.752
B1	718657.424	591816.776
B2	718377.782	591778.341
B3	718084.340	591788.446
B4	717619.055	591868.313
69c	732349.189	596628.125
70b	732633.900	596652.013
71a	732845.003	596840.203
71b	732871.109	596692.503
72a	733566.052	596972.032
72b	733603.506	596826.406
52c	721966.736	592425.070
53a	722834.578	592660.037
54a	723115.369	592852.724
55c	723441.919	593084.649
54c	723225.300	592746.256
53c	722898.404	592521.931
52d	721999.847	592278.647

LEGEND

SHEET 02 — SHEET ID

DEBRIS

2,000' 0 2,000' 4,000'

GRAPHIC SCALE 1" = 2,000'

MULTIBEAM HYDROGRAPHIC SURVEY OF PASSAIC RIVER

RIVER MILE 0.0 TO 14.3

Drawing Date:	27 JULY 2010
Drawn By:	J. Drake
Checked By:	E. DeAngelo
Drawing Name:	PR2010_SHEET01.DWG
Drawing Scale:	1" = 1,000'
Sheet Number:	1 OF 17

CONDITION SURVEY	
Survey Date:	9 JUNE 2010 – 23 JUNE 2010
Horizontal Projection:	U.S. State Plane, NAD 83
Zone:	New Jersey – 2900
Vertical Reference:	NGVD29
Survey Units:	U.S. Survey Feet

NOTES:

1. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES SHOWN AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING AT THAT TIME.
2. THE DIGITAL ORTHOPHOTOGRAPHY SHOWN WAS PUBLISHED IN 2007–2008 BY THE NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY.

GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807–1195
TEL. 302.652.4948 FAX. 302.655.9218
WILMINGTONDE@GBA–INC.COM

GBA ENGINEERS ★ SURVEYORS

MULTIBEAM HYDROGRAPHIC SURVEY OF PASSAIC RIVER

RIVER MILE 0.0 TO 0.5

Drawing Date:	27 JULY 2010
Drawn By:	J. Drake
Checked By:	E. DeAngelo
Drawing Name:	PR2010_SHEET02.DWG
Drawing Scale:	1" = 200'
Sheet Number:	2 OF 17

CONDITION SURVEY	
Survey Date:	9 JUNE 2010 – 23 JUNE 2010
Horizontal Projection:	U.S. State Plane, NAD 83
Zone:	New Jersey – 2900
Vertical Reference:	NGVD29
Survey Units:	U.S. Survey Feet

NOTES:
1. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES SHOWN AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING AT THAT TIME.
2. THE DIGITAL ORTHOPHOTOGRAPHY SHOWN WAS PUBLISHED IN 2007–2008 BY THE NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY.

GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807–1195
TEL. 302.652.4948 FAX. 302.655.9218
WILMINGTONDE@GBA–INC.COM

GBA ENGINEERS ★ SURVEYORS

MULTIBEAM HYDROGRAPHIC SURVEY OF PASSAIC RIVER

RIVER MILE 0.5 TO 1.7

Drawing Date:	27 JUNE 2010
Drawn By:	J. Drake
Checked By:	E. DeAngelo
Drawing Name:	PR2010_SHEET03.DWG
Drawing Scale:	1" = 200'
Sheet Number:	3 OF 17

CONDITION SURVEY	
Survey Date:	9 JUNE 2010 – 23 JUNE 2010
Horizontal Projection:	U.S. State Plane, NAD 83
Zone:	New Jersey – 2900
Vertical Reference:	NGVD29
Survey Units:	U.S. Survey Feet

NOTES:
1. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES SHOWN AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING AT THAT TIME.
2. THE DIGITAL ORTHOPHOTOGRAPHY SHOWN WAS PUBLISHED IN 2007–2008 BY THE NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY.

GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807–1195
TEL. 302.652.4948 FAX. 302.655.9218
WILMINGTONDE@GBA–INC.COM

GBA
ENGINEERS ★ SURVEYORS

MULTIBEAM HYDROGRAPHIC SURVEY OF PASSAIC RIVER

RIVER MILE 1.7 TO 3.1

Drawing Date:	27 JUNE 2010
Drawn By:	J. Drake
Checked By:	E. DeAngelo
Drawing Name:	PR2010_SHEET04.DWG
Drawing Scale:	1" = 200'
Sheet Number:	4 OF 17

CONDITION SURVEY	
Survey Date:	9 JUNE 2010 – 23 JUNE 2010
Horizontal Projection:	U.S. State Plane, NAD 83
Zone:	New Jersey – 2900
Vertical Reference:	NGVD29
Survey Units:	U.S. Survey Feet

NOTES:
1. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES SHOWN AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING AT THAT TIME.
2. THE DIGITAL ORTHOPHOTOGRAPHY SHOWN WAS PUBLISHED IN 2007–2008 BY THE NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY.

GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807–1195
TEL. 302.652.4948 FAX. 302.655.9218
WILMINGTONDE@GBA–INC.COM

GBA ENGINEERS ★ SURVEYORS

MULTIBEAM HYDROGRAPHIC SURVEY OF PASSAIC RIVER

RIVER MILE 3.1 TO 4.4

Drawing Date:	27 JUNE 2010
Drawn By:	J. Drake
Checked By:	E. DeAngelo
Drawing Name:	PR2010_SHEET05.DWG
Drawing Scale:	1" = 200'
Sheet Number:	5 OF 17

CONDITION SURVEY	
Survey Date:	9 JUNE 2010 – 23 JUNE 2010
Horizontal Projection:	U.S. State Plane, NAD 83
Zone:	New Jersey – 2900
Vertical Reference:	NGVD29
Survey Units:	U.S. Survey Feet

NOTES:
1. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES SHOWN AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING AT THAT TIME.
2. THE DIGITAL ORTHOPHOTOGRAPHY SHOWN WAS PUBLISHED IN 2007–2008 BY THE NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY.

GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807–1195
TEL. 302.652.4948 FAX. 302.655.9218
WILMINGTONDE@GBA–INC.COM

GBA ENGINEERS ★ SURVEYORS

MULTIBEAM HYDROGRAPHIC SURVEY OF PASSAIC RIVER

RIVER MILE 4.4 TO 5.6

Drawing Date:	27 JUNE 2010
Drawn By:	J. Drake
Checked By:	E. DeAngelo
Drawing Name:	PR2010_SHEET06.DWG
Drawing Scale:	1" = 200'
Sheet Number:	6 OF 17

CONDITION SURVEY	
Survey Date:	9 JUNE 2010 – 23 JUNE 2010
Horizontal Projection:	U.S. State Plane, NAD 83
Zone:	New Jersey – 2900
Vertical Reference:	NGVD29
Survey Units:	U.S. Survey Feet

NOTES:
1. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES SHOWN AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING AT THAT TIME.
2. THE DIGITAL ORTHOPHOTOGRAPHY SHOWN WAS PUBLISHED IN 2007–2008 BY THE NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY.

GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807–1195
TEL. 302.652.4948 FAX. 302.655.9218
WILMINGTONDE@GBA–INC.COM

GBA ENGINEERS ★ SURVEYORS

MULTIBEAM HYDROGRAPHIC SURVEY OF PASSAIC RIVER

RIVER MILE 5.6 TO 6.9

Drawing Date:	27 JUNE 2010
Drawn By:	J. Drake
Checked By:	E. DeAngelo
Drawing Name:	PR2010_SHEET07.DWG
Drawing Scale:	1" = 200'
Sheet Number:	7 OF 17

CONDITION SURVEY	
Survey Date:	9 JUNE 2010 – 23 JUNE 2010
Horizontal Projection:	U.S. State Plane, NAD 83
Zone:	New Jersey – 2900
Vertical Reference:	NGVD29
Survey Units:	U.S. Survey Feet

NOTES:
1. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES SHOWN AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING AT THAT TIME.
2. THE DIGITAL ORTHOPHOTOGRAPHY SHOWN WAS PUBLISHED IN 2007–208 BY THE NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY.

GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807–1195
TEL. 302.652.4948 FAX. 302.655.9218
WILMINGTONDE@GBA–INC.COM

GBA ENGINEERS ★ SURVEYORS

MULTIBEAM HYDROGRAPHIC SURVEY OF PASSAIC RIVER

RIVER MILE 6.9 TO 8.2

Drawing Date:	27 JULY 2010
Drawn By:	J. Drake
Checked By:	E. DeAngelo
Drawing Name:	PR2010_SHEET08.DWG
Drawing Scale:	1" = 200'
Sheet Number:	8 OF 17

CONDITION SURVEY	
Survey Date:	9 JUNE 2010 – 23 JUNE 2010
Horizontal Projection:	U.S. State Plane, NAD 83
Zone:	New Jersey – 2900
Vertical Reference:	NGVD29
Survey Units:	U.S. Survey Feet

NOTES:
1. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES SHOWN AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING AT THAT TIME.
2. THE DIGITAL ORTHOPHOTOGRAPHY SHOWN WAS PUBLISHED IN 2007–2008 BY THE NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY.

GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807–1195
TEL. 302.652.4948 FAX. 302.655.9218
WILMINGTONDE@GBA–INC.COM

GBA ENGINEERS ★ SURVEYORS

MULTIBEAM HYDROGRAPHIC SURVEY OF PASSAIC RIVER

RIVER MILE 8.2 TO 9.5

Drawing Date:	27 JULY 2010
Drawn By:	J. Drake
Checked By:	E. DeAngelo
Drawing Name:	PR2010_SHEET09.DWG
Drawing Scale:	1" = 200'
Sheet Number:	9 OF 17

CONDITION SURVEY	
Survey Date:	9 JUNE 2010 – 23 JUNE 2010
Horizontal Projection:	U.S. State Plane, NAD 83
Zone:	New Jersey – 2900
Vertical Reference:	NGVD29
Survey Units:	U.S. Survey Feet

NOTES:
1. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES SHOWN AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING AT THAT TIME.
2. THE DIGITAL ORTHOPHOTOGRAPHY SHOWN WAS PUBUSHED IN 2007–2008 BY THE NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY.

GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807–1195
TEL. 302.652.4948 FAX. 302.655.9218
WILMINGTONDE@GBA–INC.COM

GBA ENGINEERS ★ SURVEYORS

MULTIBEAM HYDROGRAPHIC SURVEY OF PASSAIC RIVER

RIVER MILE 9.5 TO 10.6

Drawing Date:	27 JULY 2010
Drawn By:	J. Drake
Checked By:	E. DeAngelo
Drawing Name:	PR2010_SHEET10.DWG
Drawing Scale:	1" = 200'
Sheet Number:	10 OF 17

CONDITION SURVEY	
Survey Date:	6 JUNE 2010 – 23 JUNE 2010
Horizontal Projection:	U.S. State Plane, NAD 83
Zone:	New Jersey – 2900
Vertical Reference:	NGVD29
Survey Units:	U.S. Survey Feet

NOTES:
1. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES SHOWN AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING AT THAT TIME.
2. THE DIGITAL ORTHOPHOTOGRAPHY SHOWN WAS PUBLISHED IN 2007–2008 BY THE NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY.

GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807–1195
TEL. 302.652.4948 FAX. 302.655.9218
WILMINGTONDE@GBA–INC.COM

GBA ENGINEERS ★ SURVEYORS

MULTIBEAM HYDROGRAPHIC SURVEY OF PASSAIC RIVER

RIVER MILE 10.6 TO 11.4

Drawing Date:	27 JULY 2010
Drawn By:	J. Drake
Checked By:	E. DeAngelo
Drawing Name:	PR2010_SHEET11.DWG
Drawing Scale:	1" = 200'
Sheet Number:	11 OF 17

CONDITION SURVEY	
Survey Date:	6 JUNE 2010 – 23 JUNE 2010
Horizontal Projection:	U.S. State Plane, NAD 83
Zone:	New Jersey – 2900
Vertical Reference:	NGVD29
Survey Units:	U.S. Survey Feet

NOTES:
1. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES SHOWN AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING AT THAT TIME.
2. THE DIGITAL ORTHOPHOTOGRAPHY SHOWN WAS PUBLISHED IN 2007–2008 BY THE NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY.

GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807–1195
TEL. 302.652.4948 FAX. 302.655.9218
WILMINGTONDE@GBA–INC.COM
GBA ENGINEERS ★ SURVEYORS

CONTINUED ON SHEET 13

CONTINUED ON SHEET 11

GRAPHIC SCALE 1" = 200'

MULTIBEAM HYDROGRAPHIC SURVEY OF PASSAIC RIVER

RIVER MILE 11.4 TO 12.7

Drawing Date:	27 JULY 2010
Drawn By:	J. Drake
Checked By:	E. DeAngelo
Drawing Name:	PR2010_SHEET12.DWG
Drawing Scale:	1" = 200'
Sheet Number:	12 OF 17

CONDITION SURVEY	
Survey Date:	6 JUNE 2010 – 23 JUNE 2010
Horizontal Projection:	U.S. State Plane, NAD 83
Zone:	New Jersey – 2900
Vertical Reference:	NGVD29
Survey Units:	U.S. Survey Feet

NOTES:
1. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES SHOWN AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING AT THAT TIME.
2. THE DIGITAL ORTHOPHOTOGRAPHY SHOWN WAS PUBLISHED IN 2007–2008 BY THE NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY.

GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807–1195
TEL. 302.652.4948 FAX. 302.655.9218
WILMINGTONDE@GBA–INC.COM

GBA ENGINEERS ★ SURVEYORS

MULTIBEAM HYDROGRAPHIC SURVEY OF PASSAIC RIVER

RIVER MILE 12.7 TO 14.0

Drawing Date:	27 JULY 2010
Drawn By:	J. Drake
Checked By:	E. DeAngelo
Drawing Name:	PR2010_SHEET13.DWG
Drawing Scale:	1" = 200'
Sheet Number:	13 OF 17

CONDITION SURVEY	
Survey Date:	9 JUNE 2010 – 23 JUNE 2010
Horizontal Projection:	U.S. State Plane, NAD 83
Zone:	New Jersey – 2900
Vertical Reference:	NGVD29
Survey Units:	U.S. Survey Feet

NOTES:
1. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES SHOWN AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING AT THAT TIME.
2. THE DIGITAL ORTHOPHOTOGRAPHY SHOWN WAS PUBLISHED IN 2007–2008 BY THE NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY.

GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807–1195
TEL. 302.652.4948 FAX. 302.655.9218
WILMINGTONDE@GBA–INC.COM

GBA
ENGINEERS ★ SURVEYORS

MULTIBEAM HYDROGRAPHIC SURVEY OF PASSAIC RIVER

RIVER MILE 14.0 TO 14.3

Drawing Date:	27 JULY 2010
Drawn By:	J. Drake
Checked By:	E. DeAngelo
Drawing Name:	PR2010_SHEET14.DWG
Drawing Scale:	1" = 200'
Sheet Number:	14 OF 17

CONDITION SURVEY	
Survey Date:	9 JUNE 2010 – 23 JUNE 2010
Horizontal Projection:	U.S. State Plane, NAD 83
Zone:	New Jersey – 2900
Vertical Reference:	NGVD29
Survey Units:	U.S. Survey Feet

NOTES:
1. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES SHOWN AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING AT THAT TIME.
2. THE DIGITAL ORTHOPHOTOGRAPHY SHOWN WAS PUBLISHED IN 2007–2008 BY THE NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY.

GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807–1195
TEL. 302.652.4948 FAX. 302.655.9218
WILMINGTONDE@GBA–INC.COM

GBA
ENGINEERS ★ SURVEYORS

DEBRIS TABLE OF COORDINATES		
NUMBER	EASTING	NORTHING
1	598,308.20	692,481.70
2	598,399.50	694,017.00
3	598,276.20	694,316.70
4	598,318.10	694,409.30
5	597,848.90	694,972.90
6	595,975.76	695,805.16
7	595,926.62	695,788.98
8	594,921.56	695,501.83
9	594,896.92	695,505.69
10	590,735.84	693,158.74
11	590,596.25	693,036.69
12	590,233.95	692,548.61
13	588,668.85	692,221.05
14	587,560.00	692,190.10
15	587,006.80	692,262.60
16	587,006.40	692,262.50
17	587,006.50	692,262.60
18	586,966.60	692,363.80
19	586,897.90	692,306.40
20	586,901.30	692,394.40
21	586,867.50	692,333.50
22	586,789.30	692,347.50
23	586,708.80	692,374.90
24	586,580.10	692,446.30
25	586,520.60	692,663.80
26	586,280.30	692,663.30
27	586,119.30	692,735.20
28	586,082.00	692,826.60
29	586,007.00	692,829.90
30	585,954.90	692,909.70
31	585,889.90	692,994.90
32	585,631.40	693,333.90
33	585,402.80	693,817.30
34	585,241.50	694,299.90
35	585,386.60	694,615.40
36	585,394.10	694,982.00
37	584,718.73	697,218.64
38	584,764.56	697,508.99
39	584,904.36	698,225.07
40	584,786.64	698,985.53
41	584,804.79	699,109.29
42	584,829.23	699,162.44
43	584,892.75	699,822.47
44	584,885.43	699,860.14
45	584,897.80	699,912.83
46	584,970.27	700,101.77
47	584,920.90	700,246.03
48	584,938.97	700,417.58
49	584,925.49	700,474.38
50	585,510.17	702,265.32
51	586,777.88	703,727.68
52	587,033.33	704,624.79
53	587,133.16	704,756.32
54	587,104.65	705,313.28
55	587,103.01	705,383.55
56	588,805.93	707,708.65
57	589,073.81	708,082.99
58	589,605.17	709,308.44
59	589,422.00	709,533.11
60	589,474.82	709,674.78
61	589,404.38	709,696.57
62	589,658.52	711,448.40
63	590,046.89	712,028.51
64	590,093.23	712,563.66
65	590,462.70	712,899.60
66	590,516.80	712,991.40

* HORIZONTAL COORDINATES ARE REFERENCED TO U.S. STATE PLANE NAD 83, ZONE NEW JERSEY – 2900 IN SURVEY FEET.
* ALL INFORMATION SHOWN ON THIS TABLE SHALL NOT BE USED FOR CONSTRUCTION PURPOSES.
* THE DEBRIS LISTED ARE SUBJECTIVE INTERPRETATIONS OF ANOMALIES OBSERVED IN THE MULTI-BEAM DATA AT THE TIME OF THE SURVEY.

DEBRIS TABLE OF COORDINATES		
NUMBER	EASTING	NORTHING
67	590,640.30	713,155.20
68	590,764.30	713,382.80
69	590,781.10	713,388.50
70	590,825.10	713,522.20
71	591,105.10	713,772.70
72	591,108.00	713,830.90
73	591,133.30	713,875.30
74	591,217.30	713,990.70
75	591,079.10	714,066.10
76	591,225.10	714,074.40
77	591,418.80	714,412.60
78	591,443.20	714,532.00
79	591,734.00	714,922.80
80	591,820.70	715,085.60
81	592,211.73	715,650.82
82	592,244.27	719,695.27
83	592,155.76	720,081.00
84	592,226.92	720,379.65
85	592,080.60	720,711.40
86	592,182.01	721,627.42
87	592,237.35	721,840.08
88	592,375.11	722,339.23
89	592,467.67	722,654.29
90	592,575.24	723,045.69
91	592,658.97	723,129.78
92	592,697.82	723,216.39
93	592,727.25	723,226.33
94	594,083.25	723,541.59
95	594,273.43	723,606.49
96	594,331.67	723,631.71
97	594,645.35	723,731.02
98	594,953.05	723,792.08
99	595,259.26	724,141.62
100	596,005.13	724,452.28
101	595,990.59	724,481.32
102	596,249.35	724,748.64
103	596,448.70	725,175.10
104	596,537.90	725,465.40
105	596,560.30	725,483.70
106	596,458.70	725,729.40
107	596,465.60	725,734.90
108	596,563.20	725,713.10
109	596,618.50	725,701.90
110	596,572.60	725,739.50
111	596,794.30	726,439.70
112	596,818.10	726,550.20
113	596,835.60	726,745.00
114	597,104.93	727,987.22
115	596,946.00	728,813.50
116	596,641.60	729,083.90
117	596,500.40	729,489.30
118	596,360.40	729,917.00
119	596,348.70	729,919.40
120	596,343.50	729,933.10
121	596,234.70	731,130.80
122	596,368.40	731,442.40
123	596,503.60	731,595.00
124	596,504.80	731,613.60
125	596,567.20	731,746.90
126	596,653.60	732,278.70
127	596,792.00	732,926.00
128	597,357.03	736,117.51
129	597,277.99	737,271.71
130	597,286.95	737,399.86
131	597,357.95	737,808.98
132	597,409.03	737,910.56

* HORIZONTAL COORDINATES ARE REFERENCED TO U.S. STATE PLANE NAD 83, ZONE NEW JERSEY – 2900 IN SURVEY FEET.
* ALL INFORMATION SHOWN ON THIS TABLE SHALL NOT BE USED FOR CONSTRUCTION PURPOSES.
* THE DEBRIS LISTED ARE SUBJECTIVE INTERPRETATIONS OF ANOMALIES OBSERVED IN THE MULTI-BEAM DATA AT THE TIME OF THE SURVEY.

MULTIBEAM HYDROGRAPHIC SURVEY OF PASSAIC RIVER

RIVER MILE 0.0 TO 14.3

Drawing Date:	27 JULY 2010
Drawn By:	J. Drake
Checked By:	E. DeAngelo
Drawing Name:	PR2010_SHEET17.DWG
Drawing Scale:	AS SHOWN
Sheet Number:	17 of 17

CONDITION SURVEY	
Survey Date:	9 JUNE 2010 – 23 JUNE 2010
Horizontal Projection:	U.S. State Plane, NAD 83
Zone:	New Jersey – 2900
Vertical Reference:	NGVD29
Survey Units:	U.S. Survey Feet

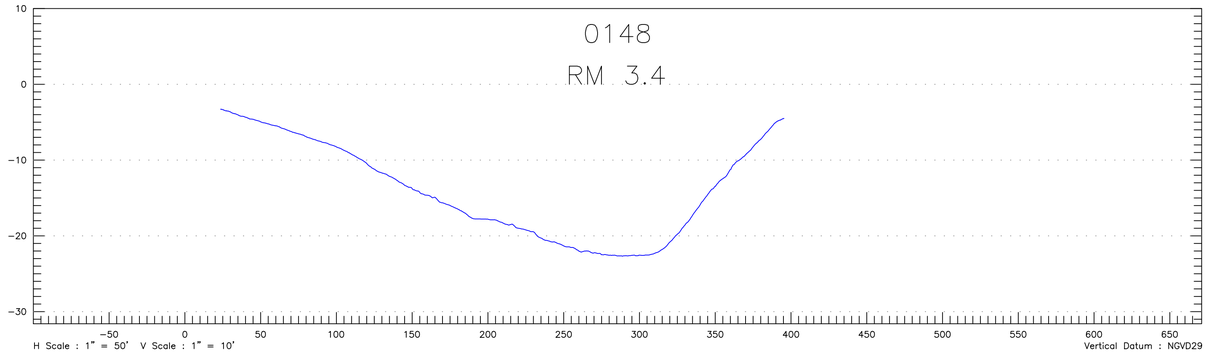
NOTES:
1. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES SHOWN AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING AT THAT TIME.

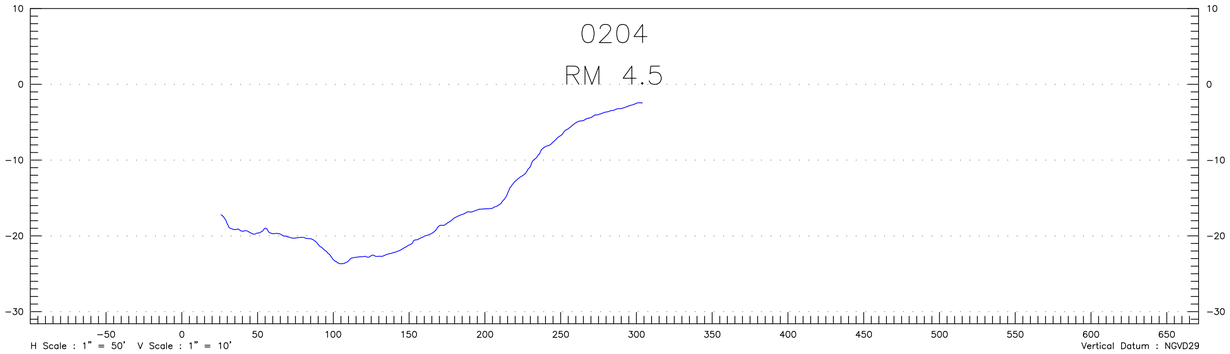
GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807-1195
TEL. 302.652.4948 FAX. 302.655.9218
WILMINGTONDE@GBA-INC.COM

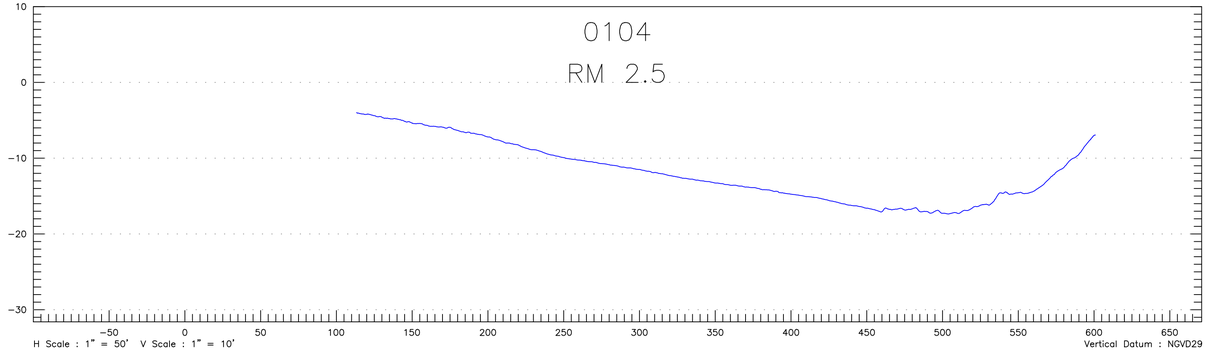
GBA ENGINEERS ★ SURVEYORS

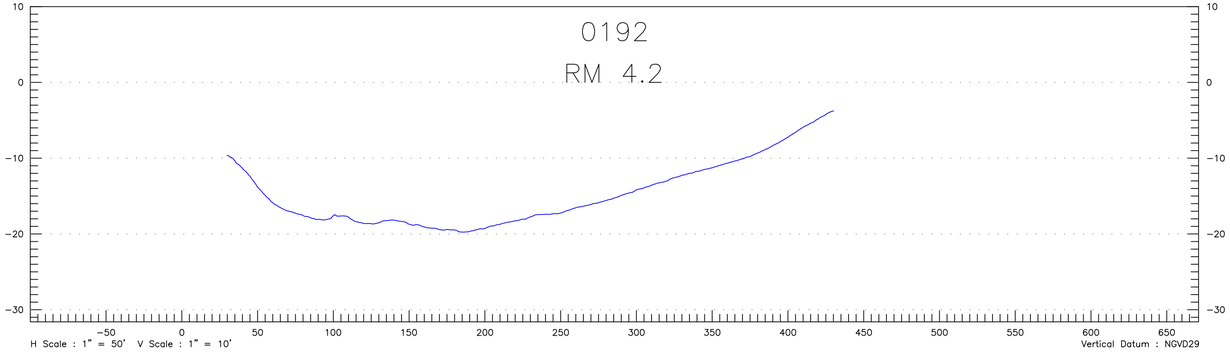
APPENDIX 3

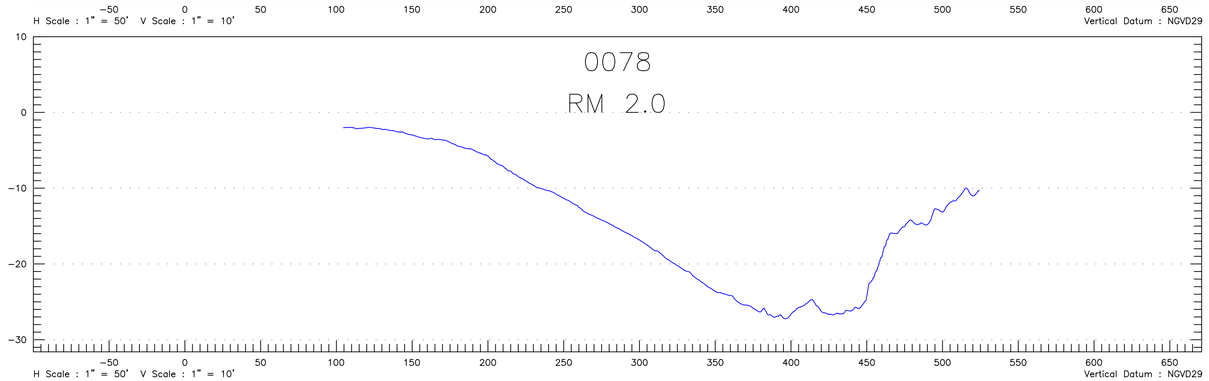
Singlebeam Cross-Sections

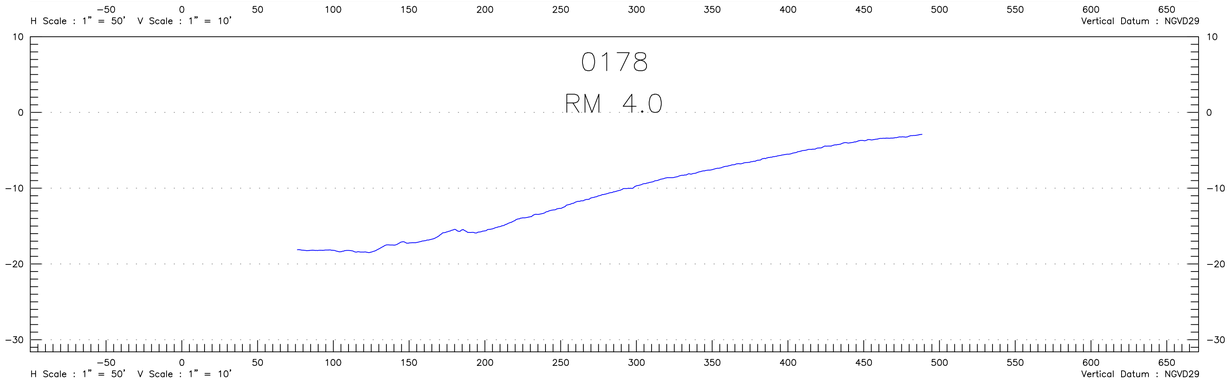


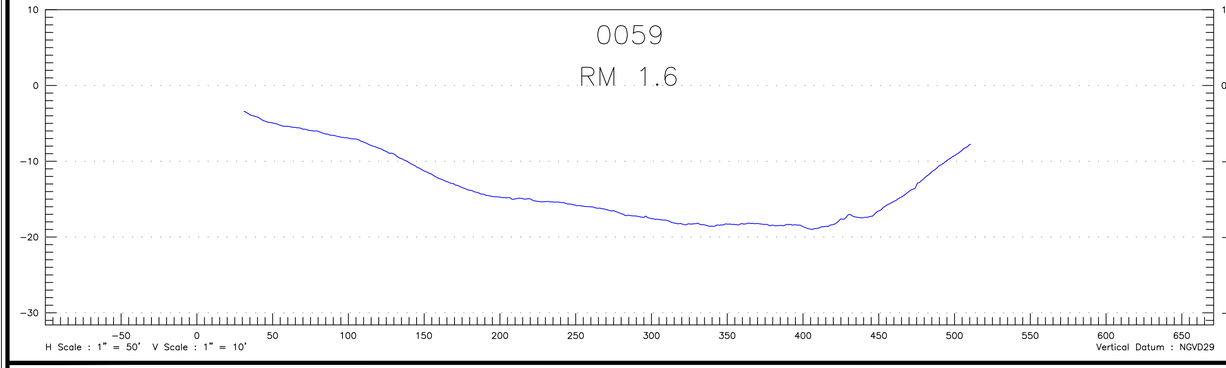


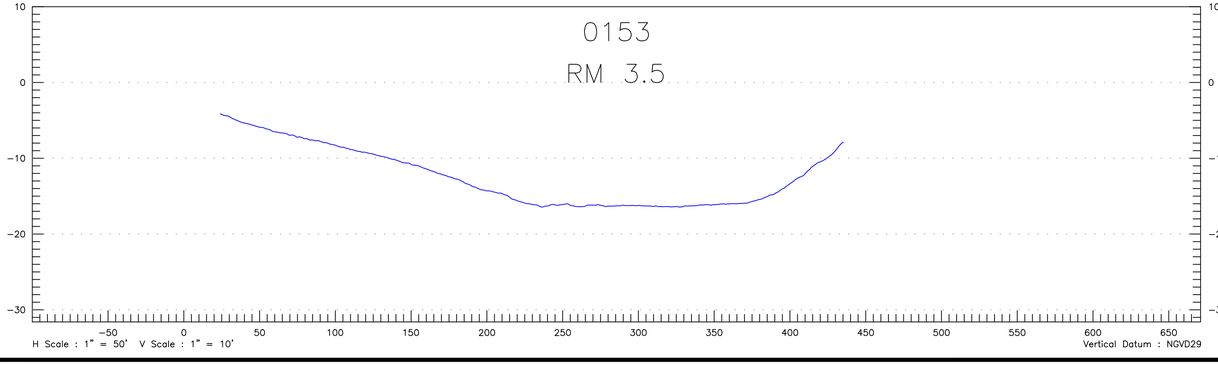












MULTIBEAM HYDROGRAPHIC SURVEY OF PASSAIC RIVER

RIVER MILE 0.0 TO 14.3

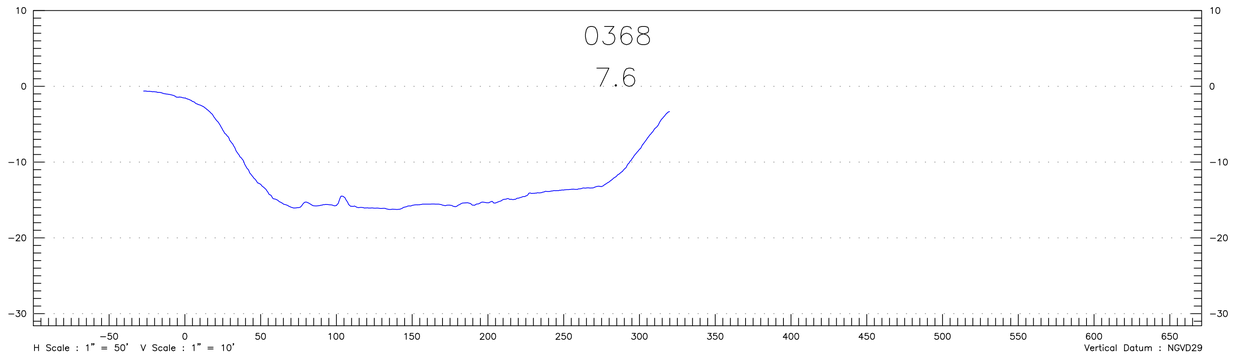
Drawing Date:	27 JULY 2010
Drawn By:	J. Drake
Checked By:	E. DeAngelo
Drawing Name:	PR2010_SHEET15.DWG
Drawing Scale:	AS SHOWN
Sheet Number:	15 of 17

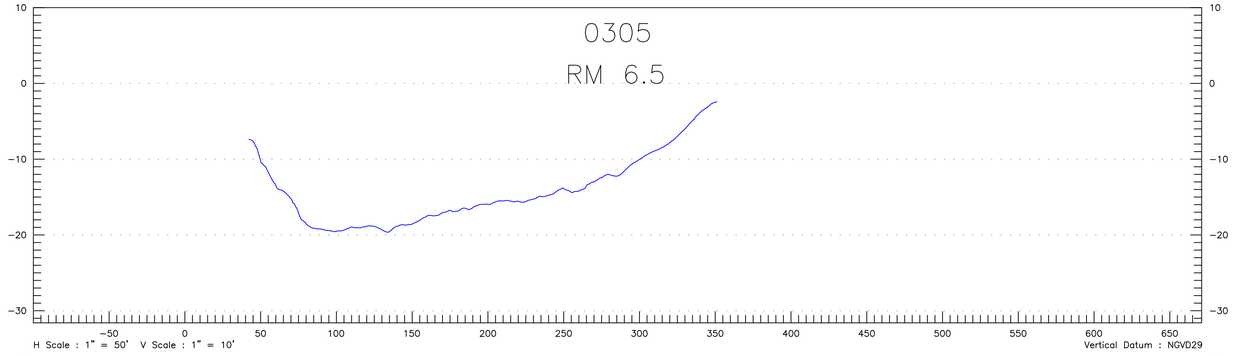
CONDITION SURVEY	
Survey Date:	9 JUNE 2010 – 23 JUNE 2010
Horizontal Projection:	U.S. State Plane, NAD 83
Zone:	New Jersey – 2900
Vertical Reference:	NGVD29
Survey Units:	U.S. Survey Feet

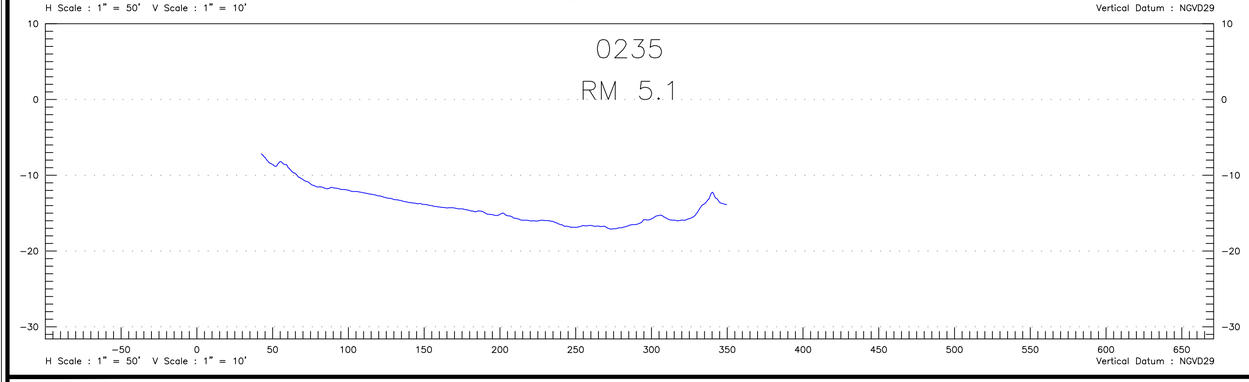
NOTES:
1. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES SHOWN AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING AT THAT TIME.

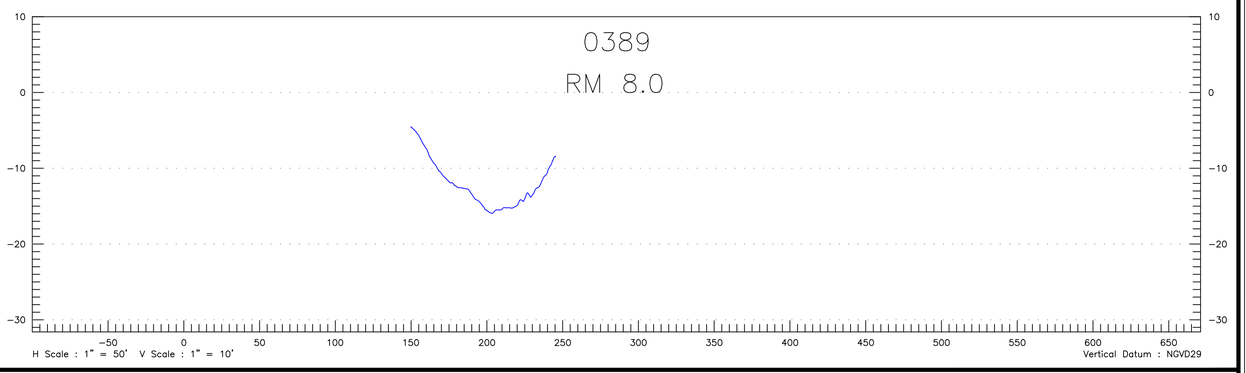
GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807-1195
TEL. 302.652.4948 FAX. 302.655.9218
WILMINGTONDE@GBA-INC.COM

GBA
ENGINEERS ★ SURVEYORS









MULTIBEAM HYDROGRAPHIC SURVEY OF PASSAIC RIVER

RIVER MILE 0.0 TO 14.3

Drawing Date:	27 JULY 2010
Drawn By:	J. Drake
Checked By:	E. DeAngelo
Drawing Name:	PR2010_SHEET16.DWG
Drawing Scale:	AS SHOWN
Sheet Number:	16 of 17

CONDITION SURVEY	
Survey Date:	9 JUNE 2010 – 23 JUNE 2010
Horizontal Projection:	U.S. State Plane, NAD 83
Zone:	New Jersey – 2900
Vertical Reference:	NGVD29
Survey Units:	U.S. Survey Feet

NOTES:
1. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES SHOWN AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING AT THAT TIME.

GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807–1195
TEL. 302.652.4948 FAX. 302.655.9218
WILMINGTONDE@GBA–INC.COM

GBA ENGINEERS ★ SURVEYORS

APPENDIX 4

Copy of Field Notes

GBA
MULTIBEAM SURVEY LOG

Date 6/8/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic Patch MB | Echo Sounder Reson 8101

Matrix/LNW File Roll 2010 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks Multi Beam Patch Test

People 5 | HORZ/VERT CHECKIN Time | RTK Tide | Tide Board

S.O.S./Draft 4546 / 3.4'

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
07:50		Sound velocity Cast @ Port Elizabeth			
		20100608-SVP.vel		Ave	4546 ft/s
		Roll Test @ Performance Grid Area			Using Key Stone
	1	001-0758	180°		RESON Setting
		001-0800	0°		Ping = 20 Hz
	2	002-0802	180°		Tx Power = 4
		002-0804	RTK Drop		Auto Gain = 4
		002-0805	0°		Gain mode = TVG
	3	003-0810	180°	offline	Pulse = 75 us
		003-0812	180°		Spread = 60
		003-0814	0°		Absorpt = 30
	4	004-0816	180°		
		004-0818	0°		
	5	005-0817	180°	Do not use RTK Drop	
		005-0824	0°	Do not USE	
		005-08 ~~180°~~			
		Switch To Leica			
		005-0831	180°		
		005 0833	0°		

SEE REVERSE OF PAGE FOR PROCESSING RESULTS

Prepared by: ECD

ROLL TEST
STARTING VALUE ⇒ -2.45

LINE #	VALUE
1	⇒ -2.50
2	⇒ -2.50
3	⇒ -2.45
4	⇒ -2.45
5	⇒ -2.50
AVE	⇒ -2.48

PITCH TEST
STARTING VALUE ⇒ +0.80

LINE	VALUE
PYZ-1B -1C	⇒ +0.60 (FLAT)
-2 -2A	⇒ +1.05 "
-3 -3A	⇒ +0.70
-4 -4A	⇒ +0.65
-5 -5A	⇒ +0.50
AVE	⇒ +0.70

START VALUE ⇒ -2.00

LINES	
PYZ-1B PYZ-2A	⇒ -2.50
PYZ-2 -3	⇒ -3.00
-2A -3A	⇒ -2.50
-3 -4	⇒ -2.00
-3A -4A	⇒ -2.00
-4 -5	⇒ -2.00
-4A -5A	⇒ -2.00
AVE	⇒ -2.30

FLAT

LATENCY TEST
START VALUE ⇒ Ø

PYZ-5 PYZ-5B	⇒ -0.15
PYZ-3A -3B	⇒ +0.05
PYZ-1D PYZ-1C	⇒ +0.00
AVE	⇒ -0.03

USE Ø

GBA
MULTIBEAM SURVEY LOG

Date 6/8/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic Patch MB | Echo Sounder Reson 8101

Matrix/LNW File PY2.Lnw/ | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) _____ | General Remarks MB Patch TEST

People _____ | HORZ/VERT CHECKIN Time _____ RTK Tide _____ Tide Board _____

S.O.S./Draft _____ | Slope Lines Pitch, Yaw, Lat

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	Pitch & YAW	Lines			
8:44	PY2-1	PY2.1	107°		
8:47		PY2.1A	289°	Lost	RTK
8:50		PY2-1B	287°		
8:52	PY2-2	PY2-2	109°		
8:53		PY2-2A	289°		
8:54	PY2.3	PY2-3	109°		
8:56		PY2-3A	289°		
8:57	PY2-4	PY2-4	109°		
8:58		PY2-4A	289°		
9:00	PY2-5	PY2-5	109°		
9:01	"	PY2-5A	287°		
	Slow	Lines for	Latency		
9:03	PY2-5	PY2-5B	109°		
9:06	PY2-3	PY2-3B	289°		
9:09	PY2-1	PY2-10	109°		

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/8/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory _____ | Echo Sounder Reson 8101

Matrix/LNW File Performance.LNWd.MTX | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) _____ | General Remarks Performance Test

People 25 | HORZ/VERT CHECKIN Time _____ RTK Tide _____ Tide Board _____

S.O.S./Draft /3.4/

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	Performance Grid Multibeam				
10:37	1	001-1039	0°		
10:41	2	002-1041	180°		
10:43	3	003-1043	0°		
10:47	4	004-1047	180°		
10:49	5	005-1048	0°		
10:51	8	008-1051	90°		
10:52	9	009-1052	270°		
10:53	10	010-1053	90°		
10:54	11	011-1054	270°		
10:55	12	012-1055	90°		
	For Beam Angle Test				
10:57	10	010-1057	270°		
10:59	03	003-1059	0°		
	Single-Beam				
11:02	Bar check		5', 45', 30', 15', 5'		
	005-1115 Do not use				
	005-1117		008-1122		
	003-1119		010-1123		
	001-1120		012-1124		

Prepared by: ECD

MULTIBEAM SURVEY LOG

Date 6/8/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic-Patch 5B | Echo Sounder Reson 8101

Matrix/LNW File ACE QC.LNW | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks USACE QC Area

People 5 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 1.1 | Single Beam

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
Bar check	~~8', 45', 30', 15'~~				
	Sound velocity due to wind & Currents 4750				
1251	ACE 11	ACE 1.RAW	35°		
	ACE 3	ACE 3.RAW	215°	offline Dont USE	
1256	ACE 3	ACE3A.RAW	215°		
1257	ACE 5	ACE 5.RAW	35°	RTK Antenna Hgt adjustment	
1259	ACE 7	ACE 7.RAW	215°	calibrate to USACE Tide Gage	
1300	ACE 9	ACE 9.RAW	35°		
1304	ACE 18	ACE 18.RAW	305		
1306	ACE 16	ACE 16.RAW	125°		
1307	ACE 14	ACE 14.RAW	305°		
1308	ACE 12	ACE 12.RAW	125°		

Prepared by: ECD

Date 6/8/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic Park MB | Echo Sounder Reson 8101

Matrix/LNW File ACE QC. LNW & MTX | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) _____ | General Remarks ACE QC

People 5 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4927 / 3.4 | Multi Beam

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
1324	ACE9	ACE9	215°		
1326	ACE8	ACE8	35°		
1327	ACE7	ACE7.RAW	215°		
1329	ACE6	ACE6.RAW	35°		
1330	ACE5	ACE5 RAW	215°		
1331	ACE4	ACE4 RAW	35°		Lost RTK
1334	ACE4	ACE4A.RAW	215°		
1335	ACE3	ACE3.RAW	35°		
1337	ACE2	ACE2.RAW	215°		
1338	ACE1	ACE1.RAW	35°		
1340	ACE18	ACE18.RAW	125°		
1341	ACE17	ACE17.RAW	305°		pont use Lost RTK
1342	ACE17	ACE17A.RAW	125°		
1344	ACE16	ACE16.RAW	305°		
1346	ACE15	ACE15.RAW	125°		
1347	ACE14	ACE14.RAW	305°		142A pont use Traffic
1349	ACE14	ACE14A.RAW	305°		
1351	ACE13	ACE13.RAW	125		Lost RTK
1352	ACE13	ACE13A	125		
1353	ACE12	ACE12	305°		
1354	ACE11	ACE11	125°		

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/8/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory _____ | Echo Sounder Reson 8101

Matrix/LNW File Performance | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks GBA RTK MB Performance

People 4 | HORZ/VERT CHECKIN Time _____ RTK Tide _____ Tide Board _____

S.O.S./Draft 4953 / 3.4 | Performance Grid w/ GBA Base Station

SV cast = 20100608_Newark_B

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
1631	1	001_1631	180°		
1632	2	002-1632	0°		
1634	3	003-1634	180°		
1636	4	004-1636	0°		
1638	5	005-1638	180°		
1641	12	012-1641	90°		
1642	11	011-1642	270°		
1643	10	010-1643	90°		
1644	9	009_1644	270°		
1646	8	008-1646	90°		

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/8/2010
Vessel Name Sea Fix
Project ID # 631-10A
Description Passaic River Multibeam

Raw Data Directory
Matrix/LNW File Performance
Average Boat Speed (kts)
People
S.O.S./Draft
Echo Sounder Reson 8101
Positioning POSMV 320 w/ Leica RTK
General Remarks
HORZ/VERT CHECKIN Time RTK Tide Tide Board
corrected Antenna Leica Performance

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	1	001 - 1652	180°		
	2	002 - 1653	0°		
	3	003 - 1654	180°		
	4	004 - 1657	0°		
	5	005 - 1658	180°		
	12	012 - 1700	90°		
	11	011 - 1701	270°		
	10	010 - 1702	90°		
	09	09A - 1703	270°		
	08	08 - 1704	90°		

Prepared by: ICD

GBA
MULTIBEAM SURVEY LOG

Date 6/9/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic - 2010 MB | Echo Sounder Reson 8101

Matrix/LNW File AOI | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks Weather Rainy

People 5

S.O.S./Draft 4953 / 3.4'

HORZ/VERT CHECKIN

Time	RTK Tide	Tide Board	Ant Hgt
13:35	-0.85	-0.80	7.3Ft

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	-0.15'	Delta Applied To Rover Ant to Account for			
	Leica System	Reference Station Antenna			
	Reson SeaBass				
	Range 50m				
	max Rate 20 p/s				
	Tx Power 4				
	Tx Pulse 75				
	Rx Gain				
	Gain MODE = TVG				
	Autogain = 4				
	Spread = 60 LogDB				
1359	Absorb = 30				
1359	AOI_30	AOI_30	341	1.1	RNG 35m
1406	AOI_44	AOI_44	161	1.4	Shadowed
1413	AOI_45	AOI_45	341	1.1	
1422	AOI_39	AOI_39	341	1.1	End @ Barges
1424	AOI_39	AOI_39A	141	1.4	
1429	AOI_34	AOI_34	341	1.2	
1438	AOI_33	AOI_33	141		Shoreline Lost RTK

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/9/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 MB | Echo Sounder Reson 8101

Matrix/LNW File AOI | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 4kts | General Remarks

People 5 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 13.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
14:41	AOI-33	AOI-33A	341	1.1	
14:47	AOI-41	AOI-41	141	1.1	GAP Filling
14:52	AOI-54	AOI-54	341	1.1	
14:57	AOI-55	AOI-55	141	1.1	
	AOI-60	AOI-61			
15:09	AOI-61	AOI-61A	341	0.9	
15:15	AOI-67	AOI-67	141	1.0	
15:23	AOI-71	AOI-71	341	1.0	
15:35	AOI-76	AOI-76	141	0.9	
15:36	AOI-080	AOI-080	341	1.0	
15:41	AOI-085	AOI-085	141	1.0	
15:47	AOI-080	AOI-080	341	0.8	
15:52	AOI-095	AOI-095	141	0.8	
15:58	AOI-100	AOI-100A	341	0.9	
16:03	AOI-105	AOI-105	141°	0.8	
16:09	AOI-109	AOI-109	341°	0.8	
16:15	AOI-114	AOI-114	141°	0.8	
16:22	AOI-119	AOI-119	341°	1.1	
16:27	AOI-123	AOI-123	141°	1.1	
16:34	AOI-127	AOI-127	341°	1.1	

Prepared by: ECO

GBA
MULTIBEAM SURVEY LOG

Date 6/05/10 **Project ID #** 631-10A

Vessel Name Sea Fix **Description** Passaic River Multibeam

Raw Data Directory Passaic 2010 MB **Echo Sounder** Reson 8101

Matrix/LNW File AOI **Positioning** POSMV 320 w/ Leica RTK

Average Boat Speed (kts) _____ **General Remarks** _____

 # People 5 **HORZ/VERT CHECKIN** Time RTK Tide Tide Board

S.O.S./Draft 4953 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	AOI_131	AOI_131	141°	1.2	
16:46	AOI_135	AOI-135	341	1.1	Dropped RTK & Circled
1652	AOI_135	AOI_135R	341°	1.1	Dropped RTK & Circled
16 54	AOI 135	AOI_135	341°	1.1	
16:57	AOI_138	AOI-138	141°	1.3	
17:05	AOI-142	AOI_142	341°	1.1	
17:12	AOI-146	AOI_146	141°	1.6	fillins
7220	AOI_150	AOI_150	341		
17 21	AOI_150	AOI_150A	141°		
17 24	AOI-154	AOI_154	341°		
17 26	AOI-020	AOI_020	341°		westshoreline
1234	AOI 120				Fill in
1236	AOI_124				Fill in
12	AOI 128				Fill in

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date: 6/9/10
Vessel Name: Sea Fix
Project ID #: 631-10A
Description: Passaic River Multibeam

Raw Data Directory: Passaic 2010 SB
Matrix/LNW File: A01_CROSS
Average Boat Speed (kts): 4
People: –
S.O.S./Draft: 4950 / 1.1

Echo Sounder: Reson 8101
Positioning: POSMV 320 w/ Leica RTK
General Remarks:

HORZ/VERT CHECKIN

Time	RTK Tide	Tide Board
1822	4.20'	4.20'

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
17:48	Barcheck		5', 30',	15', 5'	
1752	005	005 – 1752		Do not USE	
1752	005	1754	~~228~~ 249°		
1758	4	004 – 1757	69°		
1800	3	003 – 1800	249°		
1803	2	002A 1803	69°		
1806	1	001 – 1806	249°		
1808	A01_095	A01 – 095	161°		Longitudinal

Prepared by: ECD

Page 4 of 4

GBA
MULTIBEAM SURVEY LOG

Date 6/10/07 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 MB | Echo Sounder Reson 8101

Matrix/LNW File A02 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) _____ | General Remarks _____

People _____ | HORZ/VERT CHECKIN

S.O.S./Draft 4938 / 3:4 | Time 09:10 RTK Tide 2.44 Tide Board 2.50 Ant 7.3'

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
07:22	Position check @ Dock 57				9042.5, 660 438.2
09:20	SV Cast @	A02	=		4938.6
	Reson SeaHings				
	Rng 35				
	TX Power 4				
	Pulse 75 us				
	Ping 20 p/s				
	Gain MOD TVG				
	Autogain 4				
9:27	A02_54	A02-54	357	1.3	
9:30	A02-49	A02_49	177	1.4	
9:34	A02_45	A02_45	357	1.4	
9:39	A02-41	A02_41	177	1.4	
9:44	A01_35	A01_35	341	1.3	Barge Filling
9:47	A01_31	A01_31	341	1.3	Barge Fill in @ Bulkhead
9:49	A02-58	A02_58	357	1.3	
9:54	A02_37	A02_37	177	1.3	
9:58	A02_33	A02_33	357	1.3	
10:01	A02-61	A02_61	177	1.3	

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 9/10/2010 — Project ID # 631-10A

Vessel Name Sea Fix — Description Passaic River Multibeam

Raw Data Directory Passaic 2010 MB — Echo Sounder Reson 8101

Matrix/LNW File A02 & A03 — Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 4 — General Remarks

People

S.O.S./Draft

HORZ/VERT CHECKIN
Time RTK Tide Tide Board

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
10:06	A02_66	A02_66	177 ~~357~~	1.2	
10:10	A02_71	A02_71	357 ~~177~~	1.3	Do NOT USE dropped RTK
10:13	A02_71	A02_71A	177 ~~357~~	1.2	
10:17	A02_76	A02_76	B57	1.2	Ended & Circled RTK drop
10:26	A02_76	A02_76A	357	1.2	
10:24	A02_81	A02_81	177	1.2	
10:28	A02_86	A02_86	357	1.1	
10:33	A02_91	A02_91	177	1.0	
10:36	A02_95	A02_95	357	1.0	
10:42	A02_97	A02_97	177	1.0	
10:49	A02_103	A02_103	357	1.0	
10:50	A02_106	A02_106	177	1.0	
10:55	A02_105	A02_105	357	1.0	
		SV Cast	A03		
11:10	A03_065	A03_65	10°		Lost RTK Do not USE
11:12	A03_065	A03_65A	10°	1.0	
11:18	A03_61	A03_61	190°	1.0	11:20 Drop RTK circle
11:22	A03_61	A03_61A	190	1.1	
11:24	A03_57	A03_57	10°	1.1	
11:30	A03_53	A03_53	190°	1.1	

Prepared by: ECO

GBA
MULTIBEAM SURVEY LOG

Date: 6/10/2010 | Project ID #: 631-10A
Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: Passaic 2010 MB | Echo Sounder: Reson 8101
Matrix/LNW File: A03 | Positioning: POSMV 320 w/ Leica RTK
Average Boat Speed (kts): 5 kts | General Remarks:
People: 5 | HORZ/VERT CHECKIN Time: RTK Tide: Tide Board:
S.O.S./Draft: 4931 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
11:34	A03_049	A03_049	10°	1.1	
11:40	A03_045	A03_045	190°	1.1	
11:45	A03_041	A03_041	10°	1.1	
11:50	A03_037	A03_037	190°	1.5	
11:55	A03_33	A03_033	10°	1.5	
12:00	A03_29	A03_029	190°	1.5	FILL
12:03	A03_69	A03_069	10°	1.5	
12:09	A03_73	A03_073	190°	1.6	LOST RTK @ END OF LINE
12:12	A03_73	A03_073A	190°	1.1	RE-RUN P/O LAST LINE
12:15	A03_77	A03_077	10°	1.4	
12:20	A03_81	A03_081	190°	1.1	LOST RTK @ EOL - REDO
12:23	A03_81	A03_081A	190°	1.3	" " " "
12:26	"	A03_081B	190°	1.3	" " " "
12:30	"	A03_081C	100	1.2	" " " COMPLETED.
12:45	A03_85	A03_085	190°	1.2	LOST RTK @ EOL - REDO } COMBINE
12:49	"	A03_085A	10°	1.2	" " " " }
12:55	A03_89	A03_089	190°	1.2	" " "
13:02	A03_89	A03_089A	10°	1.2	
13:07	A03_93	A03_093	190°	1.2	
13:11	A03_97	A03_097	10°	1.1	

Prepared by: _____

GBA
MULTIBEAM SURVEY LOG

Date 6/10/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory PASSAIC 2010 MB | Echo Sounder Reson 8101

Matrix/LNW File A03 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 KTS | General Remarks

People 5 | HORZ/VERT CHECKIN Time 14:11 | RTK Tide -0.70 | Tide Board -0.65

S.O.S./Draft 4.93 / 3.4 ms

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
13:15	A03_101	A03_101.RAW	190°	1.2	
13:19	A03_105	A03_105	10	1.0	LOST RTK
13:23	"	A03_105A	10°	0.9	RE-RUN LOST RTK
13:25	"	A03_105B	10°	0.9	" "
13:28	"	A03_105C	10°	0.9	"
13:31	A03_108	A03_108	190°	1.0	
13:36	A03_111	A03_111	10°	0.9	LOST RTK
13:39	"	A03_111A	10°	1.1	
13:44	A03_113	A03_113	190°	1.1	
13:49	A03_115	A03_115	10°	1.1	
13:55	A03_118	A03_118	190°	1.1	
14:00	A03_121	A03_121	10°	1.1	
14:11		MID-DAY TIDE check			
14:15		SV cast A04	492 FT		
14:21	A04_77	A04_77	17°	1.2	Dropped RTK circled
14:24	A04_77	A04_77A	17°	1.2	Dropped RTK Circled
14:27	A04_77	A04_77B	176	1.2	
14:32	A04_74	A04_74	197°	1.1	
14:36	A04_71	A04_71	17°	1.1	Dropped RTK circled

Prepared by: RLS & ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/10/2010 — Project ID # 631-10A

Vessel Name Sea Fix — Description Passaic River Multibeam

Raw Data Directory Passaic 2010 mb — Echo Sounder Reson 8101

Matrix/LNW File A04 — Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) ____ — General Remarks ____

People 5 — HORZ/VERT CHECKIN Time ____ RTK Tide ____ Tide Board ____

S.O.S./Draft 4522 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
14:38	A04_71	A04-71A	17°	1.1	
14:43	A04_68	A04_68	197°	1.2	
14:48	A04_65	A04_65	170	1.1	14:49 Dropped & Circled
14:50	A04_65	A04-65A	17°	1.1	
14:54	A04_62	A04_62	197°	1.1	
15:00	A04_59	A04_59	17°	1.1	
1502	A04_56	A04_56	197°	1.1	
1506	A04_53	A04_53	17°	1.0	
1510	A04_50	A04_50	197°	1.0	
1515	A04_80	A04_80	17°	1.0	
1517	A04_83	A04_83	157°	0.9	
1524	A04_86	A04_86	17°	1.5	
1528	A04_89	A04_89	177°	1.0	
1534	A04_92	A04_92	17°	1.0	1535 Dropped RTK & Circled
1536	A04_92	A04_92A	197°	1.0	
1540	A04_059	A04_059	197°	0.8	
1544	A04_054	A04_059	17°	0.8	
1546	A04_051	A04_051	197°	0.8	
1549	A04_048	A04_048	17°	0.8	
1552	A04_45	A04_045			

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/10/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory A04 | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks

People 5 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4922 / 3.9

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
15:55	A04_043	A04_043	17°		
15:58	A04_040	A04_040	197°		
16:02	A04_095	A04_095	17°		
16:09	A04_098	A04_098	17°	1.1	
16:13	A04_101	A04_101	197	1.1	
16:19	A04_105	A04_105	17	1.1	Lost RTK
16:24	"	A04_105A	17	1.2	
16:24	A04_109	A04_109	197	1.1	
16:30	A04_113	A04_113	17	1.1	
16:34	A04_118	A04_118	197	1.2	
16:40	A04_123	A04_123	17	1.3	
16:44	A04_126	A04_126	197	1.2	
16:50	A04_130	A04_130	17	1.0	
16:55	A04_134	A04_134	197	1.3	
17:01	A04_138	A04_138	17	1.1	
17:07	A04_142	A04_142	197	1.4	
17:14	A04_146	A04_146	17	1.4	
17:19	A04_150	A04_150	197	1.3	
17:26	A04_154	A04_154	17	1.1	
17:32	A04_158	A04_158	197	1.4	

Prepared by: | Page 6 of 9

GBA
MULTIBEAM SURVEY LOG

Date 6/10/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory PASSAIC MB | Echo Sounder Reson 8101

Matrix/LNW File A04 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 5 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4'22/3'4 MB

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
17:38	A04.162	A04_162.RAW	17	1.4	
17:42	A04_166	A04_166.RAW	197	1.4	
17:47	A04_170	A04_170.	17	1.4	
17:51	A04_168	A04_168	197	1.2	
17:55	A04 164	A04_164	17	1.2	
17:57	A04_161	A04_161	197	1.2	
17:58	A04-159	A04_159	17	1.2	
18:00	A04-157	A04_157	197	1.2	
18:02	A04-155	A04_155	17	1.2	
18:05	A04-173	A04-173	197	1.2	
18:06	A04-84	A04-84	17		
18:10	SV	Cast 8	A04		

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/20/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 SB | Echo Sounder Reson 8101

Matrix/LNW File A01, A02, A03, A04 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) _____ | General Remarks _____

People _____ | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4942 / 1.1

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
18:	20	Bar check	5', 35',	15', 5'	
A01	Longitudinals				
18:32	A01_051	A01_051	341	1.4	Cnd @ Barge
18:38	A01 - 125	A01_125	161	1.4	
	A02	Cross lines		A02_CROSS.LNW	
18:45	4	004-1845	268°	1.0	
18:48	3	003-1848	268°	1.0	
18:50	2	002-1850	268°	1.0	
18:52	1	001-1852	268°	1.0	
18:54	A02-049	A02 049	177°	1.0	Longitudinals Lost RTK
18:57	A02-049	A02 049	177°	1.0	
19:02	A02-076	A02-076	357°	1.0	
19:05	A02_100	A02-100	177	1.0	
	A03	Cross lines	=>	From 2007 Single Beam	
19:11	0006	0006.RAW	268	1.0	Lines File
19:14	0011	0011.RAW	260°	1.0	
19:16	0016	0016.RAW	268	1.0	
19:19	A03-057	A03-057.RAW	189°	1.0	Longitudinal
19:22	A03-077	A03-077.RAW	190°	1.0	
19:26	A03-107	A03-107,	189°		

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date: 6/10/2010 | Project ID #: 631-10A
Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: Passaic SB | Echo Sounder: Reson 8101
Matrix/LNW File: A04 | Positioning: POSMV 320 w/ Leica RTK
Average Boat Speed (kts): 5 | General Remarks:
People: 5 | HORZ/VERT CHECKIN
S.O.S./Draft: 4942/1.1 | Time: 20:03 | RTK Tide: 4.45 | Tide Board: 4.5

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	A04_Longitudinals				
19:32	A04-075	A04-075	17°	1.0	
19:38	A04_125	A04-125	17°	0.9	
19:41	A04_100	A04-100	17°	1.0	
19:47	0045	0045.RAW	282	0.9	
19:49	0040	0040.RAW	102°	0.9	
19:51	0035	0035.RAW	285°	0.9	
19:54	0030	0030.RAW	297°	1.1	
19:57	0025	0025.RAW	106°	0.9	
	Closing Barcheck @		A01 in	Deep water.	
	30', 15', 5'				

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/11/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 MB | Echo Sounder Reson 8101

Matrix/LNW File A02 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks Shallow Edges

People 4 | HORZ/VERT CHECKIN

S.O.S./Draft 4940 | Time 08:00 | RTK Tide 3.33 | Tide Board 3.40 Ant Hgt 7.3'

08:15 = SV Cast @ A02

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
07:04	Position check @ Dock			578042.3, 660438.6	
8:22	A02-106		177		RESON Settings
0831	A02-114		177		RNG = 20 m
0835	A02-118		357		TX Pow = 4
0839	A02-122		177		Auto Gain = 4
0843	A02-121		357		
0847	A02-125		177		
0853	A02-128		357		1/2 LINE
0857	A02-131		177		"
0900	A02-134		357		"
0904	A02-137		177		"
0907	A02-139		357		"
0912	A02-142		177		"
0915	145		357		"
0916	A02-148		177		NOT NEEDED
0917	A02-148	A ROW	357		IN FILE
0920	A02-151		357		"
0921	A02-133		357		"
0924	A02-127		177		1/2 LINES
0929	A02-130		357		LOST RTK

Prepared by: PL & S ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/11/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory PASSAIC RIVER MB | Echo Sounder Reson 8101

Matrix/LNW File A02/A03 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 4 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft ~~4~~ 40/3.4 MB

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
0932	A02-130	A.RAW	177		
0936	A02-133	A.RAW	177		
0938	A02-136		177		
0940	A02-138		357		
0942	A02-140		177		
0945	A02-143		357		
	CHANGE LINE FILE TO				A03.LNW
0946	A03-121		10		
0951	A03-125		190		
0955	A03-129		10		
1000	A03-132		190		
1003	A03-135		10		PARTIAL
1007	A03-138	A.RAW	10		
1012	A03-136		190		LOST RTK
1015	A03-136	A.RAW	10		
1021	A03-138		190		
1024	A03-140		10		
1030	A03-142		190		
1034	A03-144		10		

Prepared by: _____

GBA
MULTIBEAM SURVEY LOG

Date 6/14/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory PASSAIC RIVER MB | Echo Sounder Reson 8101

Matrix/LNW File A03/A05 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 4 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4740/3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
1039	A03_144	A.RAW	10		
1044	A03_147		190		
1048	A03_145		10		FILL IN
1058	A03_123		190		LOST RTK
1058	A03_123	A.RAW	10		FILL
	CHANGE TO		REACH	A05	
1121	A05_90		10		READY
1123	"	A.RAW	10		RUN UNDER 2 BRIDGES
1130	A05_86		190		- EDIT TIDE!
1134	A05_82		10		FOR ENTIRE REACH
1141	A05_78		190		
1143	A05_74		10		
1149	A05_70		190		
1153	A05_67		10		SOUTH OF BRIDGE ONLY
1210	A05_90	B.RAW	190		
1216	A05_94		190		
1220	A05_98		10		
1227	A05_102		190		
1232	A05_106		10		
1238	A05_111		190		

Prepared by: _____

GBA
MULTIBEAM SURVEY LOG

Date 6/11/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory PassaicRiver MB | Echo Sounder Reson 8101

Matrix/LNW File A05.LNW | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 4 | HORZ/VERT CHECKIN

S.O.S./Draft 4927/3.4m

Time	RTK Tide	Tide Board
13:34	-0.94	-0.90'

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
1242	A05-115		10		EDIT RTK TIDE
1249	A05-120		190		FOR ENTIRE REACH
1255	A05-119		10		
1258	A05-123		190		
1259	A05-124		10		
1302	A05-128		190		
1305	A05-122		10		Fill
1306	A05-117		190		Fill
1309	A05-072		10		
1313	A05-110		190		
1315	A05-118		10		
1318	A05-125		190		
1321	A05-129		10		
1323	A05-131		190		
13:34	TIDE Board check				

Prepared by: _____

GBA
MULTIBEAM SURVEY LOG

Date 6/11/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory _____ | Echo Sounder Reson 8101

Matrix/LNW File A06 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 7 Kts | General Remarks _____

People 4 | HORZ/VERT CHECKIN Time _____ RTK Tide _____ Tide Board _____

S.O.S./Draft 4928 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
13:44	A06-083	A06_083	175°	1.1	
1347	A06-087	A06_087	355°	1.1	
13:49	A06-091	A06_091	175	1.1	
13:50	A06-095	A06_095	355°	1.1	
13:53	A06 101	A06_101	175°	1.1	
13:56	A06-105	A06_105	355°	1.1	next to Barge
13:58	A06-109	A06_109	175	1.1	Debris field East shore
1402	A06-113	A06_113	355	1.1	SFBO Beam @ 80°
1407	A06-078	A06_078	175	1.1	
1409	A06-075	A06_075	355°	1.1	
1412	A06-072	A06_072	175°	1.1	
1414	A06-069	A06_069	355°	1.1	
1417	A06-066	A06_066	175°	1.1	
1419	A06-063	A06_063	335	1.1	
1421	A06-064	A06_064	17[illegible]	1.1	
14	A06-061	A06_061	B35	1.1	
	A06-068	A06_68	175	1.1	Fill in
1429	A06 065	A06_065			Fill in

Prepared by: ECP

GBA
MULTIBEAM SURVEY LOG

Date 6/11/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 MB | Echo Sounder Reson 8101

Matrix/LNW File A07 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks

People 4 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4909 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
14:34	A07-079	A07_079	332°	1.1	
14:37	A07-076	A07-076	152	1.1	
14:40	A07_073	A07_073	332°	1.1	
14:42	A07 080	A07_080	152°	1.1	
14:45	A07-087	A07_087	332°	1.1	14:45
14:48	A07.085	A07_085	152°	1.1	Circled Propped RTK
14:50	A07_085	A07 085A	152°	1.1	
14:52	A07-082	A07-082	332°	1.1	
14:55	A07-77	A07_079	152°	1.1	
15:00	A07_102	A07-102	332°	1.1	
15:00	A07-105	A07-105	152°	1.1	
15:05	A07_110	A07_110	332°	1.1	
15:08	A07_113	A07_113	152°	1.1	
15:11	A07_116	A07_116	332°	1.0	
15:14	A07-119	A07_119	152°	1.1	
15:17	A07-122	A07_122	332°	1.1	
15:20	A07-125	A07-125	152°	1.1	
15:24	A07-128	A07_128	332°		open up StBD Beams
15:30	End SV Cast				

Prepared by: GCD

GBA
MULTIBEAM SURVEY LOG

Date 6/11/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory _____ | Echo Sounder Reson 8101

Matrix/LNW File _____ | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) _____ | General Remarks Single Beam Checklines

People 4 | HORZ/VERT CHECKIN 0

S.O.S./Draft _____ | Time _____ RTK Tide _____ Tide Board _____

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
15:47	0087	0087	220°		
15:48		0087A	220		
15:	0082	0082	242°		
15:	0082	0082A	92°		
	0				
1601	0078	0078	76°		
1603	0078	0078A	75°		Recd for offline
1603	0078	0078B	255°		
1607	0068	0069	95°		
1608		0069A	275°		
1612	0068	0063	275°		
1613	0063	0063A	95°		
1616	0059	0059	277°		
1617	0059	0059A	97°		
1619	0057	0057B	277°		
1622	0051	0051	281°		
1622		0051A	101°		
1624		0051B	281°		

Prepared by: ECO

GBA
MULTIBEAM SURVEY LOG

Date 6/11/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 SB | Echo Sounder Reson 8101

Matrix/LNW File Passaic 2007 SB | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) _____ | General Remarks 18:07 Positina check

People _____ | HORZ/VERT CHECKIN

S.O.S./Draft _____

Time	RTK Tide	Tide Board
17:35	2.95	2.95

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	Longitudinal Lines for A05 - A07				
~~A05~~					
1628	A05_071	A05_071			Center channel
1635	~~A05_086~~	~~A05_086~~			Lost RTK under Bridges
	A05_~~088~~	A05_086			South shore Longitudinal
1644	A05-081	North shore Longitudinal			
		A03 Cross lines			
1057	0016	0016	268°		
16:	0011	0011	268°		Do not use
17:00		0011A	268°		
17:03	0006	006	268°		
	A02	Cross lines			
	001-	001			Do not use
		001-1706	268°		
	2	002-1710	268°		
	3	003-1713	268°		
	4	004-1715	268°		
1718	A02-116				Long Line east shore A2 & A3
1726	End Bar check				20', 15', 10' @ A05

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/12/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 MB | Echo Sounder Reson 8101

Matrix/LNW File A05 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 4 kts | General Remarks

People 3

S.O.S./Draft 4993 / 3.4

HORZ/VERT CHECKIN

Time	RTK Tide	Tide Board	Ant Ht
8:48	3.60	3.65'	2.3'

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
8:5	Position Check @ Dock				579042.3 660438.6
08:49	Tide Check @	Tide Board @ Port			
08:52	SV Cast @ A05				
	RESON Settings				
	Range 20m				
	TX Power 4				
	TX Pulse 63 us				
	Gain Mode TVG				
	Autogain 4				
	A05 - Shallow	side	East		
0901	A05-125		10°	1.3	
0903	A05-128		190°	1.3	
0906	A05-131		10°	1.3	
0908	A05-133		190°	1.3	
0910	A05-135		10°	1.3	
0912	A05-137		190°	1.3	
09:15	A05-139		190°	1.3	
9:19	A05-141		10°	1.3	
9:17	A05-142 A		190	1.3	

Prepared by: ECO

GBA
MULTIBEAM SURVEY LOG

Date 6/12/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010MB | Echo Sounder Reson 8101

Matrix/LNW File A05 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 4KTS | General Remarks

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4743 / 3.4

UTC Time	MB RNG File	Line AZ	HDOP	Remarks
9:24	A05_057	10°	1.3	
9:27	A05_055	190	1.4	
9:29	A05_053	10°	1.4	
9:31	A05_51	190	1.4	
9:33	A05_49	10°	1.4	
9:36	A05_47	190°	1.3	
9:38	A05_45	10°	1.3	
9:40	A05_43	190	1.3	
9:42	A05_63	10°	1.4	
9:48	A05_61	190°	2.4	
9:52	A05_65	10°	1.5	
9:55	A05_58	190°	2.5	
9:58	A05_56	10°	1.2	
10:02	A05_54	190°	1.3	
10:06	A05_132	10°	1.3	
10:08	A05_134	190°	1.3	
10:13	A05_136	10°	1.9	open Port Beam 60° - Bulkhead
10:16	A05_138			open StBD 75° Bulkhead

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/12/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 MB | Echo Sounder Reson 8101

Matrix/LNW File A06 / A07 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) _____ | General Remarks 10:20 SV East A06

People 3 | HORZ/VERT CHECKIN Time _____ RTK Tide _____ Tide Board _____

S.O.S./Draft 4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
10:24	A06_56		355	1.0	
10:27	A06_54		175	1.0	
10:29	A06_52		355		
10:30	A06_50		175		
10:32	A06_51		355		
10:37	A06_109		355		
10:39	A06_50	A.RAW	175		
10:40	A06_52	A.RAW	175		
Switch		Reach	to	A07	
10:43	A07_080		332		
10:46	A07_077		152		
10:49	A07_75		332		
10:51	A07_73		152		
10:54	A07_71		332		
10:57	A07_69		152		
10:59	A07_67		332		
11:02	A07_65		152		
11:04	A07_63		332		
11:06	A07_157		152		NAV HAZ OPEN PORT X

Prepared by: _____

GBA
MULTIBEAM SURVEY LOG

Date 6/12/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory PASSAIC RIVER MB | Echo Sounder Reson 8101

Matrix/LNW File A08 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN

S.O.S./Draft 4043/3.4 ft | Time 1114 | RTK Tide 1.93 | Tide Board 1.9'

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
11:22	A08-[illegible]		296		EDIT RTK TIDE FOR
11:30	A08-119		116		ENTIRE RSHC: A08
11:33	A08-116		296		BRIDGE INTERFERENCE
11:38	A08-113		116		
11:42	A08-110		296		
11:46	A08-107		116		
11:51	A08-125		296		
11:55	A08-129		116		
11:58	A08-133		296		
12:02	A08-87		116		
12:05	A08-[illegible]		296		
12:10	A08-125		116		
12:13	A08-149		296		
12:16	A08-153		116		
12:20	A08-157		296		
12:25	A08-160		116		
12:28	A08-165		296		DOWNSTREAM OF AK BRIDGE
12:30	A08-169		116		
12:31	A08-172		296		
12:33	A08-175		116		

Prepared by: _____

GBA
MULTIBEAM SURVEY LOG

Date 6/12/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic River MB | Echo Sounder Reson 8101

Matrix/LNW File AOB / BOI | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks 12:49 SV Cast BOI

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 1043 / 3.4m

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
12:36	AOB - 164		296		
1239	AOB - 167		116		
1241	AOB - 170		296		
1244	AOB - 173		116		
1246	AOB - 176		296		
1249	SV cast		BOI		
1259	BOI - 122		239°	1.2	
1257	BOI - 126		90°	1.2	
1300	BOI - 129		90°	1.1	
1302	BOI - 129A		270°	1.1	
1305	BOI - 132		90°	1.0	
1309	BOI - 138		270°	1.0	
1311	BOI - 141		90°	1.3	
1314	BOI - 145		270°	0.9	
1316	BOI - 149		90	1.2	
1318	BOI - 152		270	1.2	
1321	BOI - 155		90	1.2	
1325	BOI - 158		270	0.9	
1327	BOI - 119		90	1.2	
1330	BOI - 115		270	1.2	

Prepared by: ECO

GBA
MULTIBEAM SURVEY LOG

Date 6/12/2016 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic River MB | Echo Sounder Reson 8101

Matrix/LNW File B01 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4943/3f

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
1332	B01-112		270	1.1	
1334	B01-109		90°	1.1	
1336	B01-106		270	1.2	
1339	B01-103		90°	1.1	
1341	B01-101		270°	1.7	
1344	B01-098		90°	1.1	
1346	B01-095		270°	1.1	
1350	B01-125		90		FILL
1350	B01-116		270		" Do over
1351	B01-104		90		"
1352	B01-103		270		"
1356	B01-093				

Prepared by: RAG/ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/12/10 — Project ID # 631-10A

Vessel Name Sea Fix — Description Passaic River Multibeam

Raw Data Directory Passaic 2010 SB — Echo Sounder Reson 8101

Matrix/LNW File — Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) — General Remarks Single Beam Check Lines

People 3 — HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4554/1.1

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	109		359		
1927	109	0109A	359°	1.1	
1428	109	0109B	179°	1.1	
1433	104	0104	184°	1.2	
1439	104	0104A	4°	1.2	
1443	101	0101	183°	1.1	
1444		0101A	7°	1.1	
1452	91	0091	203°	1.1	
1453		0091A	27°	1.1	
1456	87	0087	219	1.8	
1457	87	0087A	39°	1.8	
1459	82	0082	242°	1.7	
1501		0082A	62°		
1503	78	0078	255°		
1504		0078A	79°	0.9	
1506	69	0069	275		
1507		0069A	295	1.0	
1511	63	0063	275°	1.0	
1512		0063	95°	1.2	

Prepared by: ECO

GBA
MULTIBEAM SURVEY LOG

Date: 6/12/10
Vessel Name: Sea Fix
Project ID #: 631-10A
Description: Passaic River Multibeam

Raw Data Directory: Passaic 2010 SB
Matrix/LNW File: Single Beam
Average Boat Speed (kts):
People: 3
S.O.S./Draft: 49~~50~~/1.1

Echo Sounder: Reson 8101
Positioning: POSMV 320 w/ Leica RTK
General Remarks: 16:56 Position @ Dock

HORZ/VERT CHECKIN

Time	RTK Tide	Tide Board
16:18	-1.00	-0.90

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
15:14	59	0059	277		
15:15		0059A	97		
15:18	51	0051	281		
15:19		0051A	106		
	Long Lines up to Rail Road Bridge				
15:22	A05-129 East Shore			~~A05, A06, A07, A08 To RR Bridge~~	
15:23				Lost RTK under Bridge	
				Regained RTK	
15:25	Lost RTK under Bridge				
15:27	A05-088 Center Long Line A05				
15:31	A05-047 West shore Long Line				
15:36	A06-058 West Shore To R.R. Bridge				
NG 15:44	A06-053 Centerline R.R Bridge thru A06 (CUT SHORT)				
NG 15:46	A06-043 ~~CENTERLINE~~ " " " NG				
15:48	A06-075 CENTERLINE ~~RR Bridge thru~~ A06				
1550	A06-070 CENTERLINE END A06 TO R.R. BRIDGE				
1553	A06-065 EAST SHORE R.R. BRIDGE TO A06				
1602	B01-103 W. SHORE B01 REACH				
1604	B01-130 ℄ B01 REACH				
1607	B01-150 E. SHORE B01 REACH				

Prepared by: RCD / PAS

Page 8 of 8

GBA
MULTIBEAM SURVEY LOG

Date 6/13/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic2010.mb | Echo Sounder Reson 8101

Matrix/LNW File A08 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks 07:01 Position checked @ Dock

People 3 | HORZ/VERT CHECKIN

S.O.S./Draft 4041 / 3.4ns

Time	RTK Tide	Tide Board
09:29	2.35	2.40

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
0732	SV Cast @		A08		
	RESON Settings		RNG: 20m		
			max Rate 20 p/s		
			Tx Power 4		
			Pulse: 63 us		
			Gain Mode: TVG		
			AutoGain: 4		
0742	A08-174		296°	0.9	
0745	A08-176		116	0.9	
0747	A08-178		296	1.4	HAZARDS
0751	A08-110		116	1.6	
0753	A08-108		296	1.5	
0755	A08-106		116	1.5	
0757	A08-104		296	1.5	
0759	A08-102		116	1.5	-6 ELEV
0807	A08-107		116	1.4	CHECK RTK TIDE
0810	A08-105		296	1.5	BRIDGE X-INGS
0813	A08-103		116	1.4	
0816	A08-101		296	1.5	

Prepared by: PAS/ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/13/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory PASSAICRIVER\MB | Echo Sounder Reson 8101

Matrix/LNW File KPB/B01 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN

S.O.S./Draft 4.0A / 3.4 MB

Time	RTK Tide	Tide Board
0859	3.85	3.85

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
0818	A08-099		296	1.5	BRIDGE X-ING
0820	A08-097		116	1.4	CHECK RTK
0823	A08-095		296	1.4	EDIT TIDE -
08[illegible]	~~A08-093~~		~~116~~		"
0830	A08-163		116	2.6	BRIDGE
0832	A08-165		296	1.6	"
0838	A08-167		296	1.6	
0839	A08-169		116	1.7	
0840	A08-171		296	1.7	
	CHANGE REACH		TO	B01	
0847	B01-158		270	1.7	SV CAST @ 0940
0944	B01-160		90	1.1	STOP FOR BOAT REPAIR
0947	B01-162		270	1.4	OPEN STBD & CUTOFF
0955	B01-004		270		← VOID -
0951	B01-004		90	1.1	
0955	B01-092		270	1.1	
0957	B01-090		90	1.1	
1000	B01-085		270	1.1	
1002	B01-083		90	1.2	
1004	B01-081		270	1.6	

M 84

Prepared by: _____

GBA
MULTIBEAM SURVEY LOG

Date 6/13/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory PASSAIC RIVER MB | Echo Sounder Reson 8101

Matrix/LNW File B01 / B02 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft ~~4.4~~ / 3.4 MB

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
1009	B01-079		90	1.1	
1012	B01-077		270	1.2	OPEN PORT & CUTOFF TO 55°
1016	B01-067		270	1.2	FILL
	SWITCH REACH		TO	B02	
1022	B02-070		264	1.0	
1027	B02-067		84	1.0	
1031	B02-064		264	1.0	
1036	B02-061		84	1.0	
1041	B02-058		264	1.0	
1046	B02-055		84	1.0	SUNKEN BARGE ON LINE
1050	B02-055		264	1.0	" " " " FILL
1057	B02-127		84	1.0	
1101	B02-131		264	1.0	
1106	B02-134		84	1.0	OPEN PORT CUTOFF &
1111	B02-139		264	1.0	OPEN STBD CUTOFF &
1118	B02-142		84	1.0	" PORT " "
	SV CAST		B02	@ 11:25	
1130	B02-075		84	1.1	72 ft
1134	B02-077		264	1.1	
1138	B02-080		84	1.1	

Prepared by: PAS / ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/13/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory PASSAIC RIVER MB | Echo Sounder Reson 8101

Matrix/LNW File B02/B03 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5

People 3

S.O.S./Draft ~~4.9~~/ 3.4 MB

General Remarks

HORZ/VERT CHECKIN

Time | RTK Tide | Tide Board

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
1144	B02-083		264	1.6	
1150	B02-087		84	1.4	
1154	B02-090		264	1.6	
1159	B02-094		84	1.7	
1203	B02-097		264	1.4	
1209	B02-101		84	1.1	
1212	B02-107		264	1.3	NOTE B02-072 IN FILE
1218	B02-110		84	1.3	+ ~~B02-087~~
1222	B02-114		264	1.2	
1227	B02-119		84	1.2	
1231	B02-122		264	1.2	
1237	B02-125		84	1.2	FILL
	BEGIN	NEW	REACH	B03	
1255	B03-114		249	1.1	
1300	B03-118		69	1.2	
1303	B03-122		249	1.2	
1307	B03-126		69	1.1	
1311	B03-130		249	1.1	
1316	B03-110		69	1.0	
1319	B03-106		249	1.0	

M

M 122

125

M

Prepared by: _____

GBA
MULTIBEAM SURVEY LOG

Date 6/13/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic River MB | Echo Sounder Reson 8101

Matrix/LNW File 303 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4:20 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
1323	B03_102		69	1.1	
1327	B03_098		249	1.0	M
1331	B03_094		69	1.2	
1335	B03_092		249	1.1	M ~
1340	B03_089		69	1.1	
1343	B03_085		249	1.1	
1348	B03_081		69	1.1	
1351	B03_080		249	1.1	M
1357	B03_075		69	1.1	
1358	B03_074		249	1.1	
1359	B03_067		69	1.1	
1400	B03_071		249	1.1	
1401	B03_065		69	1.1	

Prepared by: _____

GBA
MULTIBEAM SURVEY LOG

Date 6/13/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010SB | Echo Sounder Reson 8101

Matrix/LNW File Passaic. Single Beam | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) _____ | General Remarks Barcheck @ 14:15

People _____ | HORZ/VERT CHECKIN Time _____ RTK Tide _____ Tide Board _____

S.O.S./Draft 4959 / 1.1

Barcheck 5', 7', 15', 10', 05'

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
14:21	148	0148	148	1.1	
14:23		0148A	328	1.1	
14:24	143	0143	162°	1.1	
		0143A	342°	1.1	
14:28	138	0138	165°	1.1	
14:29		0138A	345°	1.1	
14:31	133	0133	171°	1.1	
14:32		0133A	351°	1.1	
~~14~~	~~128~~	0128	~~172~~	1.1	
		0128			
14:35	Leica	Server	down	14:44 Back up	
14:44	128	0128	172°	1.1	
14:45	128	0128A	352°	1.1	
14:48	123	0123	173	1.1	
14:49		0123A	353	1.1	
14:51	118	0118	173	0.9	
14:52	1	0118A	353		
14:54	113	0113	172		
14:56	113A	0113A	352		

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/13/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic Single Beam | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks

People | HORZ/VERT CHECKIN

S.O.S./Draft 4.957 | Time 1609 RTK Tide -1.35 Tide Board -1.30

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
14:58	107	0107			
		0107A			
	109	109			Do not use
1518	107	107A	179°	1.0	
1519	109	109B	35°	1.0	
1521	104	104	184	1.0	
1523		104A	4°	0.8	
1525	101	101	197°	1.0	
1526		101A	7°	1.0	
				BO1 → BO3	
BO1	141	1530	LOS + RTK	North shore Long Line	
15:36	BO1	141A		Resumed North shore	
15:42	BO1	136	mid channel Long Line BO3 → BO1		
15:46	BO1	092	South Channel Long Line BO1 → BO3		
16:00	Bar check		15', 10', 5'		
16:34	Position check @ Dock				
		579042.25	6604339.41		

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/15/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic MD | Echo Sounder Reson 8101

Matrix/LNW File B04 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5kts | General Remarks 07:00 Position check @ Dock

People 2 | HORZ/VERT CHECKIN

S.O.S./Draft 4ft3 / 3.4

Time	RTK Tide	Tide Board
07:33	-0.37	-0.30

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
07:00	Position check @ Dock				578041.98 6604 38.76
	RESON Settings				
		RNG = 20m			
		max Rate = 20 p/s			
		TX Power = 4			
		TX Pulse = 63			
		Gain Mode = TVG			
		Auto Gain = 4			
07:49	B04_060		213	1.4	
07:53	B04_063		33°	1.4	
07:59	B04_067		213°	1.4	
08:03	B04_070		33°	1.4	
08:09	B04-073		213°	1.4	
8:12	B04-074		33°	1.4	
8:17	B04-078		213°	1.5	
8:21	B04-071		33°	1.5	
8:25	B04-087		213	1.6	
8:30	B04-088		33°	1.7	
8:34	B04-091		213	1.	
8:37	B04-014		33°		

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/15/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory B04 | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5kts | General Remarks

People 2 | HORZ/VERT CHECKIN Time | RTK Tide | Tide Board

S.O.S./Draft 4893 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
8:41	B04_097		213	1.2	
8:44	B04_100		33°	1.2	
8:49	B04_103		213°	1.3	
8:53	B04_057		33°	1.3	
8:58	B04_054		213°	1.3	
9:03	B04_051		33°	1.3	
9:1	B04_048		213°	1.3	
9:12	B04_045		37°	1.3	
9:17	B04_42		213°	1.1	
9:21	B04_039		33°	1.1	
9:27	B04_036		213	1.3	Dropped RTK Restart
9:27	B04_036A		213°	1.3	open Port Beams 70°
9:34	B04_034		33°	1.1	open STBD 70°
9:39	B04_0038		213	1.1	
9:41	B04_031		33°	1.1	
9:44	B04_097		213°	1.2	
9:49	B04_080		33°	1.2	
9:54	B04_105		213°	1.1	open St BD Beams To shoreline
10:00	B04_102		33°	1.2	
10:03	98A				Grp Fill

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/15/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory B610B03 | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks

People 2 | HORZ/VERT CHECKIN Time | RTK Tide | Tide Board

S.O.S./Draft 4934 / 03.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
10:05	B04_053 -	Gap Fill			
10:07	B04-049	Gap Fill			
10:08	B04_062	Gap Fill			
10:13		SV Cast +	B03		
		Switch to	B03		
10:19	B03_078		69°	1.1	
10:24	B03_075		249°	1.1	
10:27	B03-072		69°	1.0	
10:31	B03-065		249°	1.0	
10:35	B03-066		69°	1.0	
10:38	B03-063		249°	1.0	
10:42	B03_060				Gap Fills
10:42	B034-				
10:44	B03 058		249°	1.0	
10:46	B03_055		69°		
10:48	B03-052				
10:52	B03_029		245°	1.1	
	B03-126				Port Beams 60°
11:02	303 133				stBD 70°
11	B03-091				Gap Fills

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/15/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory B03 & B05 | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks

People | HORZ/VERT CHECKIN

S.O.S./Draft | Time 11:20 | RTK Tide 4.10 | Tide Board 4.20

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
11:10	B03_080			Gap Fillins	
11:12	B03_089			Gap Fill ins	
11:14	B03_131			Gap Fill ins	
11:27	B02_100			Gap Fill in @ B02	
	B6	Min-Day	Tide	-Check	
	Switch B05				
11:39	B05_055		232°	1.6	
11:41	B05_062		52°		
11:43	B05_065		232	1.4	
11:44	B06_068		52°		
11:46	B06_071		232°	1.6	
11:48	B06_074		52°	1.0	
11:50	B06_077		232°	1.0	
11:51	B06_080		52°	1.1	
11:53	B06_022		52°	1.4	South shore
11:55	B06_014		232°		Up Port 60°
11:58	B06_017		52°	1.3	STBD 60°

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/15/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory B06 | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks

People 2 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4934 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	Switch To	B06	Edges	while High Tide	
12:02	B06 - 106		265°	1.1	
12:06	B06 - 109		85°	1.3	
12:10	B06 - 112		265°	1.3	
12:14	B06 - 115		85°	1.2	
12:18	B06 - 118		265	1.2	
12:23	B06 - 121		85°	1.2	
12:27	B06 - 124		265°	1.2	
12:32	B06 - 127		85°	1.2	
12:37	B06 - 130		265°	1.2	
12:42	B06 133		85°	1.2	East end shore
12:45	B06 - 136		265		
12:47	B06 135		85	1.2	
12:49	B06 138		265°		
12:54	B06 141		85°		
12:57	B06 144		265°	1.0	
13:01	B06 068		85°	1.0	
13:07	B06 - 57		265	1.2	
13:13	B06 - 60		85°	1.1	SFBD Beam 60° Pilings
13:19	B06 - 51		265°	1.2	Port 60° shoreline

Prepared by: CCO

GBA
MULTIBEAM SURVEY LOG

Date 6/15/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory B06 | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 2 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4724 / 34

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
13:25	B06-065		85°	1.2	
13:29	B06-062		265°	1.1	
13:31	B06-59		85°	1.1	
13:32	B06-056		265°	1.1	
13:36	B06-53		85°	1.1	
13:39	SV Cast B06			Mi	
		middle	sections of	B06 & B05	
13:42	B06-072		265°	1.1	
13:46	B06-075		85°	1.1	
13:51	B06-081		265°	1.1	
13:56	B06-083		85°	1.4	
13:59	B06-086		265°	1.1	
14:05	B06-089		95°	1.1	
14:09	B06-092		265	1.1	
14:14	B06-095		85°	1.1	
14:18	B06-100		265	1.1	DO NOT USE - RTF DGPS
14:20	B06-101		265°	1.1	
14:26	B06-109		95°	1.3	

Prepared by: ECO

GBA
MULTIBEAM SURVEY LOG

Date 6/15/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory B05 | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks

People 2 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4924/3.4

~~UTC~~ EDT Time	MB RNG	File	Line AZ	HDOP	Remarks
14:33	B05_056		52°	1.1	
14:34	B05_053		232°	1.1	
14:35	B05_050		52°	1.1	
14:37	B05_047		232°	1.1	
14:40	B05_044		52°	1.1	
14:41	B05_041		232°	1.1	
14:53	B05_038A		52°	1.1	
14:56	B05_035		232°	1.0	
14:58	B05_027		52°	0.9	
14:59	B05_021		232°	1.6	
15:00	B05_020		52°	1.0	
15:01	B05_017		232°	1.0	
15:03	3V Cast	B05			

Prepared by: GCD

GBA
MULTIBEAM SURVEY LOG

Date 6/15/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic SB | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks

People | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 1.1

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
15:15		Barcheck		@ 5, 15, 10, 5	
1521	0197	0197	358	1.0	
1522		0197A	178°		
1525	0192	0192	358		
1526		0192A	178		
1528	0188	0188	356		
1529		0188A	176		
1531	0183	0183	350		
1532		0183A	170		
1534	0178	0178	340°		
1536		0178A	160°		
1539	0173	0173	328°		
1541		0173A	148		
1543	0168	0168	300°		
1544		0168A	120°		
1546	0163	0163	297°		
1547		0163A	117°		
1549	0158	0158	296°		
1550		0158A	116		

Prepared by: GCD

GBA
MULTIBEAM SURVEY LOG

Date 6/15/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic SB | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 2 | HORZ/VERT CHECKIN

S.O.S./Draft 1.1 | Time 16:54 | RTK Tide -1.15 | Tide Board -1.10

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
15:51	0153	0153	314°		
15:53		0153A	134		
15:55	0148	0148	328°		
1556		0148 A	148		
15:58	0143	0143	342°		
15:59		0143A	162°		
16:01	0138	0138	345°		
16:02		0138A	165°		
16:04	0133	0133	351		
16:05		0133A	171		
	Long Lines				
West/South shoreline		000_1608.RAW			B03 → B06
Centerline		000_1621 RAW			B06 → B03
East/North		Toe line	000_1633.RAW		
16:46		Bacchek @ Jackson St Bridge			B06
		15', 10', 5'			
16:54		RTK Tide check			
16:29		Position check @ dock			

Prepared by: ECO

GBA
MULTIBEAM SURVEY LOG

Date 6/16/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 MB | Echo Sounder Reson 8101

Matrix/LNW File B07 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 2 | HORZ/VERT CHECKIN

S.O.S./Draft 4890 / 3.4

Time	RTK Tide	Tide Board
7:30	-1.80	-1.75

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
7:05	Position check @ Dock				579041.65, 660437.19
7:35	RTK Tide check @ "Port"				
07:40	SV Cast @	B07			
	Reson settings				
	RNG = 20m				
	Max Rate = 20 p/s				
	Tx Pulse = 63 us				
	Tx Power = 4				
	Autogain = 4				
07:48	B07-031	95°	1.5		Bridge @ End
07:51	B07-028	275°	1.4		Bridge @ start
07:53	B07-025	75°	1.4		open Beam - STBD side wall
07:56	B07-022	95°	1.4		open Beams ~~Port~~ STBD Dropped
08:17	B07-022A	95°	1.5		
8:20	B07-033	95°	1.6		Bridge @ End
8:24	B07-036	275	1.2		Bridge @ start
8:26	B07-037	95°	1.1		End @ Bridge
8:30	B07-040	95°	1.2		
8:31	B07-043	275	1.7		
8:32	B07-047	95°	1.2		under Bridge @ end

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/16/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010MB | Echo Sounder Reson 8101

Matrix/LNW File B07 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) _____ | General Remarks _____

People 2 | HORZ/VERT CHECKIN Time _____ RTK Tide _____ Tide Board _____

S.O.S./Draft 4850 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
9:35	B07-057		275°	1.2	Bridge @ Start
9:37	B07-054		95°	1.2	Bridge @ End
9:40	B07-058		275°	1.2	Bridge @ Start
9:42	B07-061		95°	1.2	
9:48	B07 064A		95	1.3	end @ Bridge
9:50	B07 067		275	1.3	
9:57	B07-070		95°	1.3	
9:54	B07-073		275		
	8:55	SV Cast	B08		
8:58	B08-029		295°	1.3	
9:01	B08-025		115°	1.5	
9:03	B08-022		295°	1.3	wall construction
9:05	B08-018		115°	1.3	open STBD 60° - Wall
9:10	B08-033		295°	1.3	
9:12	B08-036		115°	1.3	
9:15	B08-039		295°	1.3	
9:17	B08-044		115°	1.5	
9:19	B08-050		295	1.5	
9:21	B08-054		115°	1.3	

Prepared by: ECO

GBA
MULTIBEAM SURVEY LOG

Date: 6/16/10 | Project ID #: 631-10A
Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: Passaic MB 2010 | Echo Sounder: Reson 8101
Matrix/LNW File: B08 / B07 | Positioning: POSMV 320 w/ Leica RTK
Average Boat Speed (kts): | General Remarks:
People: 2 | HORZ/VERT CHECKIN Time: RTK Tide: Tide Board:
S.O.S./Draft: 4.24 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
9:23	B08-057		295	1.3	
9:25	B08-060		115°	1.3	
9:27	B08-063		295	1.3	
9:29	B08-066		115	1.3	
9:31	B08-069				
		Switch	To B09		
9:37	B09-018		317°	1.3	End @ Bridge
9:39	B09-015		137	2.6	C.
9:41	B09-013		317	1.1	wall on Port Side
9:42	B09-010		137	1.5	
9:44	B09-008		317°	1.3	Port Beam 70°
9:47	B09-022		137°	1.3	
9:	B09-026		317°	1.3	
9:51	B09-030		137°	1.2	
9:53	B09-034		317°	1.2	under Bridge Lost RTK
9:55	B09-039		137°	1.3	under Bridge Lost RTK
9:57	B09-044		317°	1.2	under Bridge Lost RTK
10:00	B09-050		137°	1.2	under Bridge
10:03	B09-053		317°	1.2	
10:05	B09-057		137	1.3	

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/16/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 mB | Echo Sounder Reson 8101

Matrix/LNW File B07 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 2 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4924 / 3.9

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
10:08	B09_060		319°	1.1	
10:10	B09-064		137°	1.2	
10:13	B09_067		317°	1.1	
10:15	B07-070		137	1.2	
10:18	B07_071				
		B8 Edge			
10:22	B09-001		115	1.0	
10:25	B08-002		135°	1.0	
	B07 Edge				
10:30	B07-067		95°	1.0	
10:32	B07-072		275	1.0	
	B07 075		95°	1.0	
	Switch To		C01		
10:37	SV Cast				
10:44	C01-083		155°	1.1	
*	C01-086				DO NOT USE
10:48	C01-085		155	1.0	
10:51	C01_088		1335°	1.2	
10:53	C01_91		155°		

Prepared by: ECO

GBA
MULTIBEAM SURVEY LOG

Date: 6/16/10 | Project ID #: 631-10A
Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: C01 | Echo Sounder: Reson 8101
Matrix/LNW File: | Positioning: POSMV 320 w/ Leica RTK
Average Boat Speed (kts): | General Remarks:
People: | HORZ/VERT CHECKIN
S.O.S./Draft: 4'9/3 / 3.4 | Time: 12:05 RTK Tide: 4.10 Tide Board: 4.10

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
10:57	C01	026	155°	1.2	Lost RTK @ Bridge
11:00	C01	023	155°		
11:03	C01	020	335°	1.2	DO NOT USE Lost RTK
11:05	C01	020 A	155°	1.1	
11:08	C01	019	335°	1.1	Lost RTK Briefly
11:09	C01	018	155°	1.2	
11:12	C01	015	335°	1.2	
11:14	C01	014	155°		
	Switch	C02	Edges		
11:17	C02	017	342°	1.2	Stop @ Bridge
	C02	019	162°	1.5 per	steep Wall on STBD
					open STBD Beams ↑
11:30	C02	082	342°	1.4	
11:36	C02	083	162°		open Port Beam steep Slope/wall
11:41	C02	089	342°		STBD Beam 60° ↑
11:47	C02	078	162°	1.6	
11:	SV	Cast	C02		
12:05	RTK	Tide Check			@ Port

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/16/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 MB | Echo Sounder Reson 8101

Matrix/LNW File C01 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 4 | General Remarks

People 2 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4924 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
1	12:14	SV	Cast	C016	
12:23	C01-062		155°	1.2	
12:27	C01-079		155°	1.2	
12:30	C01-076		155°	1.2	
12:33	C01-071		155°	1.2	
12:37	C01-068		155°	1.2	
12:40	C01-065		155°	1.2	
2:43	C01-062		155°	1.2	
12:45	C01 056		155°	1.2	
12:49	C01 053		155°	0.9	
12:52	C01-048		155°	1.0	
13:04	C01-044		155°	1.0	
13:09	C01-038		155	1.0	
13:11	C01-034		335	1.0	
13:13	C01-030		155°	1.0	
13:15	C01-27		335°	1.2	

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date: 6/16/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: Passaic 2010 MB | Echo Sounder: Reson 8101

Matrix/LNW File: CO2 | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 5kts | General Remarks: SV cast 14:45 Co2 B

People: 2 | HORZ/VERT CHECKIN

S.O.S./Draft: 4924/ 3.4 | Time | RTK Tide | Tide Board

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
13:18	CO2	017	342°	1.1	
13:24	CO2	022	162°	1.1	
13:25	CO2	026	162°	1.1	DO NOT USE
13:28	CO2	026A	162°	1.1	
13:32	CO2	026	342°	1.1	
13:38	CO2	032	162°	1.1	
13:42	CO2	036	342°	1.1	
13:48	CO2	040	162°	1.1	
13:53	CO2	043	342°	1.1	
13:58	CO2	040	162°	1.2	
14:02	CO2	052	342°	1.2	
14:09	CO2	056	162°	1.1	
14:14	CO2	060	342°	1.1	
14:19	CO2	064	162°	1.3	
14:24	CO2	068	342°	1.1	
14:30	CO2	072	162°	1.3	
14:32	CO2	074	162°	1.1	
14:38	CO2	75	342°	1.1	
14:40	CO2	053			Gap
14:41	CO2	053A			Gap Fill
14:42	CO2	023			Gap Fill

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/16/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Single Beam | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks

People | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4%0 / 1.1

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	M'52	Barcheck	5',	10', 3'	
14:56	249	249	75°	1.0	
14:57		249A	255°		
14:59	245	245	72°		
		245A	252°		
15:01	240	240	272°	0.8	
15:02		240A	252		
15:04	235	235	72	1.0	
15:05		235A	252		
15:07	230	230	72°	1.0	
15:08		230A	252°		Disregard R. File
15:10	225	225	69°	1.6	
15:11		225A	249		
15:13	220	220	64°	1.0	
		220A	244		
15:20	215	215	41°	1.4	
15:21		215	221°	0.9	
15:23	210	210	213°	0.9	
15:25	210	210A C	33	0.7	

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date: 6/16/2010 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: Passaic 20105B | Echo Sounder: Reson 8101

Matrix/LNW File: | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): | General Remarks:

People: | HORZ/VERT CHECKIN

S.O.S./Draft: 1.4

Time	RTK Tide	Tide Board
1613	0.12	0.10

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
15:26		204	188°		
15:27		204A	8°		
	Longitudinals		B07 - B07		
1529	000-1529			0.8	northshore B07-B09
15:33	000-1533			1.0	Midchannel B09-B07
15:36	000-1536				South shore B07→B09
	Longitudinals		C01 & C02		
1541	000-1541		RTK Hole PFB		C01→C02 WEST Shore
1547	000-1547				C02→C01 mid channel
1556	000-1556				C01→C02 East Shore
16:00	Bar check		@ Bridge		of Bridge
		10.5'			
16:13	TIDE check				
17:00	Position check		@ Dock		579042.03, 660438.82

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/17/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Performance | Echo Sounder Reson 8101

Matrix/LNW File In Newark Bay | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks

People | HORZ/VERT CHECKIN Time | RTK Tide | Tide Board

S.O.S./Draft 4946 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
07:02	Position check @ Dock				750942.21, 660435.55
	Mid Survey	Performance Test			
07:20	SV Profile	@ Performance			
		Multi Beam			
7:27	001 - 0727				Reson 50m
7:28	002 - 0728				Pulse w/ 75 us
7:29	003 - 0729				
7:30	004 - 0730				
7:32	005 - 0732				
7:33	006 - 0733				
7:34	009 - 0734				
7:35	010 - 0735				
7:37	011 - 0737				
7:39	012 - 0739				
	Barcheck 5', 45', 30', 15', 5'				
Single Beam Lines					
	001 - 0746			008 - 800	
	002 - 0748			009 - 0759	
	003 - 0750			010 - 0758	
	004 - 0751			011 - 0757	
	005 - 0752 DO NOTUS - 0754			012 - 0756	

Prepared by: RCD

GBA
MULTIBEAM SURVEY LOG

Date 6/17/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory C03 | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks

People 3 | HORZ/VERT CHECKIN

S.O.S./Draft | Time 8:15 | RTK Tide -1.50 | Tide Board -1.50 Ant 2.3'

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
8:16	RTK Tide Check @ "Port"				
	C03 SV Cast				UNDER Bridges!
8:38	C03 - 025				under Bridge
8:40	C03 - 028				under Bridge
8:40	C03 - 031				under Bridge
8:41	C03 - 034				under Bridge
8:43	C03 - 035				"
8:44	C03 - 023				"
8:45	C03 - 055		176°		" Extended!!
8:47	C03 - 058		356°		"
8:48	C03 - 061		176°		"
8:50	C03 - 067		356°		"
8:52	C03 068		176		"
8:53	C03 - 058				"
8:55	C03 - 052				"
8:58	C03 - 036				"
8:59	C03 - 033				"
9:00	C03 - 030				"
9:02	C03 - 027				"
9:04	C03 - 024				"

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date: 6/17/10 | Project ID #: 631-10A
Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: C03 | Echo Sounder: Reson 8101
Matrix/LNW File: | Positioning: POSMV 320 w/ Leica RTK
Average Boat Speed (kts): | General Remarks:
People: 3 | HORZ/VERT CHECKIN Time: RTK Tide: Tide Board:
S.O.S./Draft: 4890 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
9:06	C03_19		176°	1.3	open air lines
9:08	C03_21		356	1.5	
9:10	C03_24		176°	1.3	
9:12	C03_27		356°	1.5	
9:13	C03_33A		176°	1.5	
9:15	C03_036A		356°	1.3	
9:16	C03_042		176°	1.1	
9:18	C03_046		356°	1.3	
9:20	C03_049		176°	1.5	
9:22	C03_055		356	1.3	
9:23	C03_059		176°	1.5	
9:24	C03_066		356°	1.3	
9:26	C03_069		176°	1.3	
9:28	C03_072		356°	1.3	
9:30	C03_075		176°	1.4	

Prepared by: CD

GBA
MULTIBEAM SURVEY LOG

Date: 6/17/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: C09 | Echo Sounder: Reson 8101

Matrix/LNW File: | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 5 | General Remarks: SV Cast C04 9:35

People: 3 | HORZ/VERT CHECKIN

S.O.S./Draft: 48% / 3.4 | Time | RTK Tide | Tide Board

UTC Time	MB RNG File	Line AZ	HDOP	Remarks
9:38	C09_064	8°	1.2	
9:41	C09_067	188		
	C04_070	8°	1.4	
9:43	C04_042	188°	1.2	Do not use
9:49	C04_062A	8°	1.2	
9:51	C04_059	188°	1.2	
9:57	C04_055	8°	1.3	
9:59	C04_055A	8°	1.3	
10:01	C04_052	188°	1.1	
10:04	C04_046	8°	1.6	
10:06	C04_043	188°	1.1	
1007	C04_040	8°	1.2	
10:09	C04_36	188°	1.2	
10:11	C09_31	8°	1.6	
10:16	C04_27	188°	1.2	
10:16	C04_24			
10:18	C04_21			

Prepared by: SCD

GBA
MULTIBEAM SURVEY LOG

Date: 6/17/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: | Echo Sounder: Reson 8101

Matrix/LNW File: C05 | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 5 | General Remarks: 10:23 SV Cast C05

People: 3 | HORZ/VERT CHECKIN Time: RTK Tide: Tide Board:

S.O.S./Draft: 4892 | Gap value clay St Bridge

UTC Time	MB RNG File	Line AZ	HDOP	Remarks
10:28	C05_058	7°	1.0	
10:30	C05_061	187°	1.7	
10:32	C05_064	7°	1.7	
10:35	C05_55	187°	1.7	
10:38	C05-50	7°	1.0	
10:43	C05-047	187	1.0	
10:48	C05-044	7	1.0	DIFF C END
11:02 ~~10:53~~	C05-044	187	2.0	RUN N-SIDE
11:08	C05-041	7	1.9	
11:12	C05-038	187	1.8	
11:17	C05-035	7	1.8	
11:21	C05-032	187	2.0	
11:27	C05-029	7	2.6	FOLIAGE
11:30	C05-26	187		open STBD Beams Trees 2 wall
11:35	C05_23	7	1.4	
11:38	C05_65	187	1.1	TREE
11:41	C05_68	7°		NO RTK don't USE
11:44	C05_68A	187°		open Port Beams
11:49	C0_45	7°		Gap Fill
11:50	C0-	19		Gap Fill

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date _____ Project ID # 631-10A

Vessel Name Sea Fix Description Passaic River Multibeam

Raw Data Directory _____ Echo Sounder Reson 8101

Matrix/LNW File _____ Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) _____ General Remarks _____

People _____ HORZ/VERT CHECKIN Time _____ RTK Tide _____ Tide Board _____

S.O.S./Draft _____

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
11:53	COS_24		7	2.0	
11:56	COS-22		187	1.9	
11:59	COS-019		7	2.0	
12:01	COS-016		187	2.0	
12:03	COS-013		7	2.0	
12:06	COS-011		187	2.0	
12:09	COS-007		7	2.0	BEAMS OPEN PORT SIDE
12:11	COS-004		187	2.0	" " STBD
12:15	COS-052		187	2.0	
12:18	COS-056		7	2.0	
12:21	COS-059		187	2.0	
12:23	COS-062		7	2.0	
12:26	COS-065		187	2.0	
12:28	COS-068		7	2.0	
12:31	COS-071		187	2.3	
12:35	COS-074		7	2.3	BEAMS OPEN STBD / TREES

Prepared by: _____

GBA
MULTIBEAM SURVEY LOG

Date 6/17/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory _____ | Echo Sounder Reson 8101

Matrix/LNW File _____ | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) _____ | General Remarks 12:45 SV Cast C06

People _____ | HORZ/VERT CHECKIN Time 12:43 | RTK Tide 3.81 | Tide Board @ Path 3 3.76

S.O.S./Draft _____

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	RTK Tide check		PATH 3		
12:52	C06 - 10		196°	2.1	
12:54	C06 - 07		16	1.8	
12:57	C06 - 04		196	1.9	BEAMS OPEN STBD
12:59	C06 - 57		16	1.7	
13:00	C06 - 60		196	1.6	
13:01	C06 - 63		16	1.6	
13:02	C06 - 66		196	1.6	
13:04	C06 - 69		16	1.9	
13:05	C06 - 72		196	1.9	
	C06 - 75		16		
13:10	C07 - 019		25°	2.0	
13:13	C07 - 016		205°	~~2.2~~ 1.9	
13:16	C07 - 013		25°	1.9	OPEN BEAMS PORT
13:22	C07 - 073		205	2.1	
13:24	C07 - 076		25	2.2	
13:27	C07 - 079		205	2.1	
13:31	C06 - 55		196	2.1	
13:34	C06 - 52		16	2.3	
13:36	C06 - 49		196	2.4	

Prepared by: _____

GBA
MULTIBEAM SURVEY LOG

Date: 6/17/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: | Echo Sounder: Reson 8101

Matrix/LNW File: | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): | General Remarks:

People: | HORZ/VERT CHECKIN Time: RTK Tide: Tide Board:

S.O.S./Draft:

UTC Time	MB RNG File	Line AZ	HDOP	Remarks
13:37	C06-46	16	2.0	
13:38	C06-43	196	2.4	
13:39	C06-40	16	2.0	
13:41	C06-37	196	2.5	
13:43	C06-37	16	2.5	
13:44	C06-34	196	2.5	
13:45	C06-27	16	2.5	
13:46	C06-24	196	2.5	
13:48	C06-17	16	2.0	
13:51	C07-22	25	2.6	
13:54	C07-025	205	2	
13:57	C07-028	25	2.1	
13:59	C07-025	205	2.2	
14:02	C07-042	25	2.2	
14:05	C07-046	205	2.0	
14:07	C07-050	25	2.3	
14:10	C07-059	205	2.4	
14:12	C07-058	25	2.0	
14:15	C07-062	205	2.3	
14:17	C07-066	25	2.2	

Prepared by:

GBA
MULTIBEAM SURVEY LOG

Date: 6/17/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: | Echo Sounder: Reson 8101

Matrix/LNW File: C08 & C07 | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 5 | General Remarks: 14:20 JV Cast C08

People: 3 | HORZ/VERT CHECKIN

S.O.S./Draft: 4900/3.4 | Time | RTK Tide | Tide Board

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
14:20	C07	069	205	2.0	
14:22	C07	067	25	2.2	SM. AT. PICK UP
/		Switch	C07		
14:30	C08	81	35	1.1	
14:35	C08	83	215		open Port Beams shoreline
14:37	C08	86	35		open STBD Beams 60°
14:44	C08	75	215	1.7	
14:49	C08	74	35	2.0	
14:53	C08	31	215	1.9	
14:57	C08	29	35	1.9	OPEN PORT BEAMS - SHORE - LOST NTK
15:00	"		35	2.0	RE-RUN - LOST NTK
15:04	C08	26	215	1.9	OPEN STBD BEAMS - SHORE
15:06	C08	36	215	1.9	
15:10	C08	40	35	1.7	
15:15	C08	43	215	1.7	
15:18	C08	46	35	1.9	
15:22	C08	49/50	215	1.7	
15:26	C08	53	35	1.7	
15:31	C08	56	215	1.7	
15:34	C08	59	35	1.7	

Prepared by:

GBA
MULTIBEAM SURVEY LOG

Date 6/17/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory ~~C08~~ | Echo Sounder Reson 8101

Matrix/LNW File C 08 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4900/3.9

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	~~C08-62~~		~~215~~	~~1.7~~	
15:39	C08-	64	215	1.7	
15:42	C08-	70	25	1.6	
15:47	C08-	76	215	1.6	PICK UP GAP
15:49	C08-	78	215	1.6	" "
15:49	C08-	73	215	2.0	" "
15:52	SV Cast C	C08			

Prepared by: _____

GBA
MULTIBEAM SURVEY LOG

Date 8/17/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic SB | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks

People 3 | HORZ/VERT CHECKIN

S.O.S./Draft 4909 / 1.2 | Time 17:53 RTK Tide -0.7 Tide Board -0.6 Ant Hgt 7.3'

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
16:00	Bar check		5', 15', 10', 5'		
16:07	0330	330	304	1.3	
16:10		330	124		
16:12	0325	0325	304	1.3	
16:13		0325A	124		
16:15	0320	0320	305		
16:16		0320A	125		
16:18	0315	0315	304		
16:19		0315A	124		
16:20	0310	0310	299	1.3	
16:21		0310A	119		
16:23	0305	0305	298	1.0	
16:24		0305A	118		
16:26	0300	0300	285		
16:27		0300A	105		
16:29	0295	0295	278		
16:30		0295A	98		
16:31	0.290	0290	279		
16:32		0290A	99		

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date: 6/17/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: PASSAIC SB | Echo Sounder: Reson 8101

Matrix/LNW File: | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 7 | General Remarks:

People: 3 | HORZ/VERT CHECKIN — Time: | RTK Tide: | Tide Board:

S.O.S./Draft: 4909/1.2

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	~~0285~~	0285			
		~~0285A~~			
16:34		EAST SHORE		~~1.8~~	LONGITS COS - COB
16:43		CENTERLINE			LONGITS "
16:50		WEST SHORE			" "
17:02	0283	0283			PASS SIG 1ST
1703		0283A		2.0	SB - XS
1705	0277	0277		1.8	
1708	"	0277A		1.8	
	~~0272~~	~~0272~~	~~289~~	~~1.8~~	
		~~0272A~~	89		
17:08		WEST BANK		1.4	LONGITS COS-COB
17:10		CENTERLINE			" "
17:13		EAST BANK			" "
17:17	0269	0269	98	1.4	SB - XS
17:18		0269A	278		
17:20	0266	0266	98	2.0	
17:23		0266A	278		
17:24		EAST BANK		2.3	LONGITS COS-COB
17:26		"			" "
17:28		WEST BANK			" "

Prepared by:

GBA
MULTIBEAM SURVEY LOG

Date: 6/17/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: PASSAIC SB | Echo Sounder: Reson 8101

Matrix/LNW File: | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 6.0 | General Remarks:

People: 3 | HORZ/VERT CHECKIN

S.O.S./Draft: 4909/1.2

Time	RTK Tide	Tide Board
17:53	-0.70	-0.60

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
17:32	0255	0255	87	2.0	SB - XS COS - COS
17:33		0255A	267	1.4	
17:34		WEST BANK		2.3	LONGITS COS - COS
17:37		LX			" "
17:38		EAST BANK			" "
17:42		Barcheck	15', 10', 5'		
18:27		Position check @ Dock			577092.12, 660937.06

Prepared by: _____

GBA
MULTIBEAM SURVEY LOG

Date 6/18/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 mb | Echo Sounder Reson 8101

Matrix/LNW File C04 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks

People 2 | HORZ/VERT CHECKIN

S.O.S./Draft | Time 7:46 | RTK Tide -1.40 | Tide Board -1.35

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
7:06		Position check @ Dock			Port Elizabeth
			279040.12		579041.75, 660439.06
7:46		Tide check @ Port Clay ST Bridge Filling			
8:04		C04_65	Filling		
8:05		C04_57	8°		RESON Settings
8:08		C04_061	188		RNG 20m
8:09		C04_66	8°		Pulse Rate @ 20p/s
8:11		C04_38	188°		Pulse Width 65 sec
8:12		C04_33	8		TxPower 4
8:13		C04_28	188°		Autogain 4
8:14		C04_25	8°		
		SOUND VELOCITY CAST @ 09:20			c=4891.7

Prepared by: ECD

Page 1 of 8

GBA
MULTIBEAM SURVEY LOG

Date: 6/18/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: | Echo Sounder: Reson 8101

Matrix/LNW File: C09 / C10 | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 5 | General Remarks:

People: 3 | HORZ/VERT CHECKIN

S.O.S./Draft: 4891.7/3.4 | Time | RTK Tide | Tide Board

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
9:28	C09-	052	17	2.1	START C09
9:31	C09-	049	197	2.0	
9:33	C09-	046	17	2.1	
9:35	C09-	043	197		BOAT - SUNK
9:38	C09-	040	17	2.0	
9:40	C09-	037	197	2.0	
9:42	C09-	034	17	2.0	
9:43	C09-	055	197	2.0	
9:47	C09-	058	17	2.0	
9:50	C09-	061	197		
9:52	C09-	064	17	1.2	
9:54	C09-	067	197	2.1	
9:57	C09-	070	17	2.0	
10:00	C09-	073	197	1.9	moved BOAT - PORT SIDE
10:03	C09-	076	17	1.9	BOAT MOORED - STBD
10:05	C09-	079	197	1.8	
10:10	C10-	SV Cast C10			4892.7
10:12	C10-	031	2	1.9	START C10
10:14	C10-	029	182	1.9	
10:17	C10-	026	2	1.8	

Prepared by:

GBA
MULTIBEAM SURVEY LOG

Date: 6/18/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: | Echo Sounder: Reson 8101

Matrix/LNW File: C10 / C11 | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 5-6 | General Remarks:

People: 3 | HORZ/VERT CHECKIN — Time: | RTK Tide: | Tide Board:

S.O.S./Draft: 4892.7 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
10:18	C10	023	182	1.7	C10
10:21	C10	020	2	1.9	
10:23	C10	017	182	1.9	
10:27	C10	034	2	1.9	
10:28	C10	037	182	~~1.7~~ 1.9	
10:31	C10	040	2	1.9	
10:33	C10	043	182	1.9	
10:35	C10	046	2	1.9	
10:38	C10	049	182	1.9	
10:41	C10	052	2	1.9	
10:44	C10	055	182	1.9	GAP PICKUP
10:49	C10	058	2	1.9	
	SV	CAST	C11	@ 10:45	4899
10:58	C11	034	22	1.8	START C11 - LOST RTK
10:58	C11	034	22	2.0	RE-RUN
10:59	C11	031	202	2.0	
11:01	C11	028	22	2.0	TREE @ END (N)
11:03	C11	025	202	1.9	"
11:06	C11	037	22	1.9	

Prepared by: _____ Page 3 of 8

GBA
MULTIBEAM SURVEY LOG

Date: 6/18/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: | Echo Sounder: Reson 8101

Matrix/LNW File: C11 / D01 | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 5 | General Remarks:

People: 3 | HORZ/VERT CHECKIN Time: RTK Tide: Tide Board:

S.O.S./Draft: 4899 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
11:07	C11	-040	202	1.9	C11
11:09	C11	-043	22	1.9	
11:11	C11	-047	202	1.9	
11:15	C11	-050	22	1.8	
11:17	C11	-054	202	1.8	
11:19	C11	-057	22		
11:21	C11	-060	202	2.0	~~PARTIAL (N)~~
11:23	C11	-063	22		" PARTIAL (N)
11:24	C11	-066	202	1.4	"
11:27	C11	-068	22		"
		START D01 - SV CAST @ 11:30 - 4899			
11:34	D01	-096	41	~~2.1~~ 1.9	START D01
11:39	D01	-099	221	1.7	
11:43	D01	-093	41	1.9	
11:47	D01	-090	221	1.9	
11:52	D01	-086	41		TREE
11:56	D01	-083	221	2.4	"
12:01	D01	-080	41		
12:06	D01	-077	221		OPEN PORT BEAMS - SLOPE
12:12	D01	-102	41	2.0	

Prepared by: _____

GBA
MULTIBEAM SURVEY LOG

Date: 6/18/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: | Echo Sounder: Reson 8101

Matrix/LNW File: ~~D~~01/ C09 | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 5 | General Remarks:

People: 3 | HORZ/VERT CHECKIN

S.O.S./Draft: 4895/3.4

Time	RTK Tide	Tide Board
13:21	4.20	4.19

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
12:16	D01 -	105	221	2.4	BRIDGE
12:20	D01 -	108	41	1.9	LOST RTK - MID
12:24	D01 -	108	41	2.0	RUN N - ½
12:29	D01 -	112	221	1.9	BRIDGE - TREE ⊙ N
12:35	D01 -	116	41	~~2.2~~/1.7	
12:39	D01 -	119	221	2.1	LOST RTK
12:42	D01 -	119	221	1.8 -> 18	RE-RUN ENTIRE - LOST RTK BAD (PART)
12:44	D01 -	119	221	1.8 mvt	RE-RUN PARTIAL
12:48	D01 -	122	41	1.8	
~~12:51~~	D01 -	125	221	1.8	
~~12:56~~	D01 -	128	41°	1.0	
~~13:00~~	D01 -	131	221°	1.0	
~~13:05~~	D01 -	134	41°	1.1	
13:11	D01 -	074A	221°	1.1	
		BANKS @	C09	- SV	CAST @ 13:25 - 4910
13:34	C09 -	036	17°		C09 - BANKS - FALSE START @ FIRST - BAD
13:36	C09 -	029	197	2.4	
13:39	C09 -	027	17		BOAT - DOCK
13:42	C09 -	026	197	2.0	OPEN - STBD BEAMS
13:45	C09 -	081	17		BOAT

Prepared by: _____

GBA
MULTIBEAM SURVEY LOG

Date: 6/18/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: | Echo Sounder: Reson 8101

Matrix/LNW File: C09/10/11 | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 4 | General Remarks:

People: 3 | HORZ/VERT CHECKIN Time: RTK Tide: Tide Board:

S.O.S./Draft:

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
13:49	C09	081	197	2.0	BOAT
13:51	C09	084	17	2.4	TOO MANY MOORINGS - CAN'T NAVIGATE
13:58	C09	077	197	2.2	//
14:00	C09	083	17		
14:06	C10	014	2	2.3	C10 - BANK ← PORT OPEN Beams
14:09	C10	017	182		
14:10	C10	020	2		END SHORT - PILINGS
14:13	C10	055	182	1.9	END SHORT - DEBRIS
14:16	C10	057	182		
14:17 14:20	C10	060	2	2.2	BOAT
	C10	063	182	1.1	
14:23	C10	064	2		
14:26	C10	066	182		OPEN PORT BEAMS - CAN'T GET CLOSER
14:31	C11	024	22	2.3	
14:34	C11	023	202		
14:36	C11	022	22	1.9	
14:41	C11	071	202		
14:42	C11	072	22	2.1	

Prepared by:

GBA
MULTIBEAM SURVEY LOG

Date: 6/18/16 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: | Echo Sounder: Reson 8101

Matrix/LNW File: | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 4 | General Remarks:

People: 8 | HORZ/VERT CHECKIN

S.O.S./Draft: | Time | RTK Tide | Tide Board

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
14:44	C11	-075	202	2.1	
14:45	C11	-076	22		
14:46	C11	-077	202		
14:50	D01	-127	41°	2.0	CLEANUP - RTK SPIKE CEN
14:55	D01	-068	41°	1.9	
14:56	D01	-71			
14:57	D01	-087	41	2.1	BRIDGE
14:58	D01	-090	221	2.1	
15:00	D01	-079	41	2.0	
15:02	D01	-076	221	2.1	
15:03	D01	-093A	41	1.7	
15:04	D01	-098	221	1.9	
15:05	D01	-102	41	1.7	

Prepared by:

GBA
MULTIBEAM SURVEY LOG

Date: 6/18/2010 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: Passaic 2010 SB | Echo Sounder: Reson 8101

Matrix/LNW File: | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): | General Remarks: 16:34 Position check @ CP6

People: | HORZ/VERT CHECKIN Time: RTK Tide: Tide Board:

S.O.S./Draft: 11.2

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
15:11		Barcheck @	001		
15:15	375	0375	300	1.0	
15:16		0375A	126		
15:18	370	0370	310	1.0	
15:19		0370A	130		
15:21	365	0365	310	0.8	
15:22		0365A	130		
1524	360	360	305°	0.8	
15:25		360A	125°		
15:27	355	0355	305°	0.8	
15:29	350	350	291	0.9	
15:32	345	0345	279°		
15:35	340	340	263°	0.9	Mooring line
15:36		340A			
15:38	335	335	294°	0.9	
		Long Lines			
15:39		000_1539			Westshore CP9 → 01
15:47		000_1547			Centerline 01 → CP9
15:53		000_1554			EAST SHORE CP → 01
16:02	Bar	check			

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/19/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory _____ | Echo Sounder Reson 8101

Matrix/LNW File _____ | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks _____

People 3 | HORZ/VERT CHECKIN

S.O.S./Draft 4911 / 5.4 | Time 9:20 | RTK Tide -1.16 | Tide Board -1.17

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
8:18		Position check @		GPS	Dock
8:53		SV Cast D01			
8:58		D01_105	221	1.2	
9:02		D01_108	41°	1.3	
9:07		D01_110	221°	1.5	
9:10		D01_113	41°	1.3	
		Switch D02			
9:16		D02_53	32°	1.3	
9:18		D02_56	212°	1.4	
9:20		D02_59	32°	1.4	
9:22		D02_62	212°	1.4	
		D02_65	32°	1.4	
9:28		D02_51	212	1.4	
9:30		D02_48	32		
9:31		D02_46	212	1.4	
9:34		D02_46	32		RE-RUN GAPS
9:36		D02_43	212		
9:39		D02_40	32	1.4	
9:40		D02_38	212	1.4	

Prepared by: ECP

GBA
MULTIBEAM SURVEY LOG

Date 6/19/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory | Echo Sounder Reson 8101

Matrix/LNW File D03 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 4.5 | General Remarks

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4911 / 3.9

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
9:43	D02	34	212		
9:44	D02	32	32		
9:45	D02	29	212		
9:46	D02	29	32	1.2	GAP FILL
					START D03
9:47	D03	45	354		
9:53	D03	52	174	2.3	
9:58	D03	55	354	1.8	
10:03	D03	58	174	1.8	
10:04	D03	61	354	1.8	
10:06	D03	49	174	1.8	
10:10	D03	46	354	1.9	
10:15	D03	43	174	1.7	
10:18	D03	40	354	1.9	
10:21	D03	37	174	1.9	
10:24	D03	34	354	1.9	
10:27	D03	31	174	1.9	
10:31	D03	28	354	2.1 1.9	
10:34	D03	25	174	1.9	
10:38	D03	47	354	2.1	FILL GAP

Prepared by: _____

GBA
MULTIBEAM SURVEY LOG

Date: 6/19/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: | Echo Sounder: Reson 8101

Matrix/LNW File: D04 | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 5 | General Remarks:

People: 3 | HORZ/VERT CHECKIN Time: RTK Tide: Tide Board:

S.O.S./Draft: 4895.7/3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	SV CAST C		10:40	-	4895.7
10:46	D04-33		7°	2.1	START D04
10:49	D04-30		187°		RUN LONGER THAN REACH
10:51	D04-36		7	2.0	UP INTO BRIDGE
10:53	D04-42		187	1.8	
10:55	D04-45		7	2.0	
10:57	D04-48		187	2.0	
10:59	D04-51		7		
11:02	D04-51		187	1.1	CLEAN GAPS
11:03	D04-31		7	1.9	
11:05	D04-27		187	2.0	
11:08	D04-25		7	1.9	
11:10	D04-22		187	1.8	
11:13	D04-19		7	1.9	
11:15	D04-17		187	1.4	
11:17	D04-14		7		
11:21	D04-10		7	1.4	
11:22	D04-06		7°	1.4	
11:24	D04-05		187°		
11:25	D04-02				

Prepared by:

GBA
MULTIBEAM SURVEY LOG

Date 6/19/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory 005 | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 2 | HORZ/VERT CHECKIN

S.O.S./Draft 4896 / 3.4 | Time | RTK Tide | Tide Board

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	Under Bridge only				
11:27	005 - 34		26	1.4	
11:28	005 - 31		206	1.7	
11:30	005 - 28		26°	1.4	
11:31	005 - 37		206°	1.4	
11:33	005 - 42		26°		
	Clean air Lines				
11:35	005 - 43				
11:36	005 - 43A		26°	1.4	
11:39	005 - 46		206°	1.9	
11:43	005 - 49		26	1.4	
11:45	005 - 52		206	1.9	
11:49	005 - 41		26	1.3	
11:52	005 - 38		206	2.0	
11:56	005 - 35		26		
11:58	005 - 32		206		
12:02	005 - 29		26	1.2	
12:04	005 - 26		206	2.0	
12:08	005 - 23		26	1.8	
12:11	005 - 19		206		

Prepared by: _____

GBA
MULTIBEAM SURVEY LOG

Date: 6/19/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: D05/D02/D03 | Echo Sounder: Reson 8101

Matrix/LNW File: | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 4-5 | General Remarks:

People: 3 | HORZ/VERT CHECKIN

S.O.S./Draft: 4897 / 3.4

Time	RTK Tide	Tide Board
12:56	1.90	1.95

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
12:15	D05 -	16	26°	1.2	
12:18	D05 -	13	206	2.3	
		SV CAST @	12:25		- D06 - 4897
12:56		RTK TIDE check @ Path 3			
12:42	D02 -	SV CAST @	12:45		D02 - EDGES
12:48	D02 -	68			Lost RTK
12:50	D02 -	65	212°		East Shore 70° Port / Trees RTK
12:53	D02 -	69	32		70° STBD TREES
12:56	D02 -	43A	212°		West Shore STBD 70°
13:01	D02 -	42	32°	1.2	
13:03	D02 -	39	212°	1.2	
13:	D02 -	37	32°		
13:09	D02	34A	212°	1.2	WES ~~East~~ Edge
		D03	Edge		
13:14	D03 -	56	354		East Shore Trees
13:17	D03 -	60	174	1.1	Port Beam 70° Trees
13:23	D03 -	61	354		STBD 70° Trees
13:28	D03 -	73	174	1.1	
13:30	D03 -	73	354	2.0	
13:32	D03 -	74	174	1.1	

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date: 6/19/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: 1 | Echo Sounder: Reson 8101

Matrix/LNW File: D03/ | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 4 | General Remarks

People: 3 | HORZ/VERT CHECKIN

S.O.S./Draft: 3.4 | Time | RTK Tide | Tide Board

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
13:34	D03-24		174°	1-1	BANKS
13:41	D03-27		174	2.0	
13:44	D03-35		174	1.5	
13:47	D03-32		174		VERY SHOAL!
					USE 70° - WALL
13:48	D03-20			1.2	OPEN PORT BEAMS-WALL
	13:56	SV Cast @ D05			
	Switch	D05 Edges			
14:00	D05-134		26°	wall	WEST Shore Port 70°!
14:03	D05 12		206°		west shore wall STBD 70°
14:08	D05-53		26	1.5	E. SHORE
14:10	D05-56		206°	1.6	
14:14	D05-57		26	1.6	HEAVY TREES - RTK SPIKE - Soft
14:18	D06-68		36°	2.4	START D06 - E. BANK
14:22	D06-69		216	1.1	
14:25	D06-71		36	1.8	
14:28	D06-25		216	1.9	WEST BANK
14:31	D06-22		36	1.8	
14:34	D06-20		216	1.7	STBD BEAMS OPEN

Prepared by:

GBA
MULTIBEAM SURVEY LOG

Date: 6/19/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: | Echo Sounder: Reson 8101

Matrix/LNW File: D07/D08/D09 | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 4 | General Remarks:

People: 3 | HORZ/VERT CHECKIN Time: RTK Tide: Tide Board:

S.O.S./Draft: 13.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
14:44	D07	- 10	28°	2.0	FALSE START @ 1ST
14:47	D07	- 09	208°	2.1	WEST BANK - LOST RTK
14:50	D07	- 09	208	~~2.1~~ 1.9	TO MANY TREES - OPEN STBD BEAMS
14:55	D07	- 52	28	2.1	EAST BANK
14:58	D07	- 53	208	2.0	
15:03	D07	- 55	28	1.7	
15:10	D08	- 43	35°	1.7	D08 - WEST BANK
15:12	D08	- 40	215°	1.7	
15:14	D08	- 38	35	1.7	
15:16	D08	- 35	215	1.7	
15:19	D08	- 69	35	1.7	EAST BANK
15:20	D08	- 72	215	1.7	
15:23	D08	- 74	35	1.7	
15:25	D08	- 76	215	1.3	
15:27	D08	- 76A	35	2.0	OPENED STBD BEAMS - TREES
15:30	D09	- 18	18	1.7	WEST BANK D09
15:31	D09	- 16	198	1.8	

Prepared by:

GBA
MULTIBEAM SURVEY LOG

Date: 6/19/10 | Project ID #: 631-10A
Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: | Echo Sounder: Reson 8101
Matrix/LNW File: D09 & D05SB | Positioning: POSMV 320 w/ Leica RTK
Average Boat Speed (kts): 4 | General Remarks:
People: 3 | HORZ/VERT CHECKIN — Time: 16:35 | RTK Tide: 4.2' | Tide Board: 4.1'
S.O.S./Draft: 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
15:32	D09-13		18°	1.7	
15:34	D09-10		198°	1.6	
15:35	D09-10		18	1.6	GAP FILL
15:36	D09-48		198	1.1	EAST SHORE
15:38	D09-51		18	2.4	
15:40	D09-54		198	2.3	
15:41	D09-57		18	1.6	
15:52	BARNACLE				BOR CHECK
15:55	CROSS 05		298°	2.6	SB LINES (XS)
15:56	CROSS 05A		118		
15:58	CROSS 06		295	2.2	
15:59	CROSS 06A		115	1.2	
16:01	CROSS 07		297	2.1	
16:02	CROSS 07A		117	2.0	
~~16:03~~	~~CROSS 08~~				
	~~CROSS 08A~~				
16:04		EAST	X	1.3	LONGITS - EAST SHORE
16:07		Q		2.0	
16:10		WEST		2.0	

Prepared by:

GBA
MULTIBEAM SURVEY LOG

Date 6/20/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010SB | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN

S.O.S./Draft [illegible] / 1.2

Time	RTK Tide	Tide Board
7:36	0.40	0.35

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	POSITION CHK @		7:15	✓	
	✓ TIDE CHK @		7:15	→ D 0.14' X CHECK @ NOTES	
					SINGLE BEAM XS
7:36	TIDE check @		Notes		
	Single Beam		check lines		
09:45		Barcheck	5',		
2:55	0368	368	310°	1.3	one of 2009 13
2:58		369A	130°	1.3	
3:08		370	312	1.5	
3:19		371	128°		
8:01		372	209°	1.6	
8:01		372A	119	1.6	
8:04		373	275	1.6	Bow on Cotton
8:04		373A	95°	1.6	
8:05		373B	75°	1.1	
8:07		374	263°	.6	
8:08		374B	83°		
8:11		Cross 01	268		
8:12		01A	88		

Prepared by: MD

GBA
MULTIBEAM SURVEY LOG

Date 6/30/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 8101SB | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 1896 / 1.2

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
8:14		CROSS 02	269°	1.2	
8:15		02A	89°		
8:17		CROSS 03	W		
8:19		03A	E		
9:19		CROSS 04	303°	1.2	
6:20		04A	123		
		Long Lines	004-2	002	
8:22		000-0822		1.2	East Bank South Bound Trees;
8:27		000-0827		1.6	Center channel
8:34		000-0834		1.7	
8:45		CROSS 08	306°	2.1	SB XS
8:46		08A	126°	1.3	
8:48		CROSS 09	308	1.3	
8:49		09A	128	1.3	
8:51		CROSS 10	298°	2.1	
8:52		10A	118	2.0	
8:54		CROSS 11	298	1.5	
8:55		11A	11B	1.5	
8:57		CROSS 12	299	2.1	

Prepared by: JCO

GBA
MULTIBEAM SURVEY LOG

Date: 6/20/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: PASSAIC2010SB | Echo Sounder: Reson 8101

Matrix/LNW File: | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 5 | General Remarks:

People: 3 | HORZ/VERT CHECKIN — Time: | RTK Tide: | Tide Board:

S.O.S./Draft: +898/1.2

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
8:58		CROSS 12A	119°	1.6	SB XS
8:59		CROSS 13	301	1.5	
9:00		13A	121	2.1	
9:02		CROSS 14	305	1.5	
9:02		14A	125	1.5	
9:04		CROSS 15	287	1.5	
9:05		15A	107	1.5	
9:07		CROSS 16	256	1.3	
9:08		16A	76	1.6	
9:09		CROSS 17	248	1.5	
9:10		17A	68	2.1	
9:12		CROSS 18	253	1.5	
9:13		18A	73	1.5	
9:15		CROSS 19	258	2.1	
9:15		19A	78	1.3	
9:17		CROSS 20	275	1.4	
9:18		20A	95	1.3	
9:20		CROSS 21	292	1.4	
9:20		21A	112	2.0	
9:22		CROSS 22	279	2.0	

Prepared by: BGU

GBA
MULTIBEAM SURVEY LOG

Date: 6/20/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: PASSAIC20102B | Echo Sounder: Reson 8101

Matrix/LNW File: | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 5 | General Remarks:

People: 3 | HORZ/VERT CHECKIN Time: RTK Tide: Tide Board:

S.O.S./Draft: 4898/1.2

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
9:23		CROSS 22A	99	1.8	SB XS
9:25		CROSS 23	274	1.3	
9:26		23A	94	2.1	
9:28		CROSS 24	273	1.4	
9:28		24A	93	2.0	
9:30		000_0930	—	2.1	LONGITS EAST SHORE
9:43		000_0943	—	1.2	C
9:57		000_0957	—	1.9	WEST SHORE
10:10		Barcheck	12'	10' 5'	

Prepared by: BGC

GBA
MULTIBEAM SURVEY LOG

Date 6/20/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010MB | Echo Sounder Reson 8101

Matrix/LNW File D06/D07 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks SV Cast D06

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4902/3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
10:13	SV cast @	D06			Reson settings
10:20	D05	- 27	36°	1.0	RNG 20m
10:22	D06	- 31	216	1.1	Power - 4
10:25	D06	- 09	36°	1.1	Autogain - 4
10:28	D06	- 34	216°	1.9	Pulse width - 63 us
10:31	D06	- 37	36	1.9	
10:34	D06	- 40	216	1.9	
10:36	D06	- 44	36	1.9	
10:39	D06	- 47	216	1.8	
10:42	D06	- 50	36	2.1	
10:45	D06	- 53	216	2.0	
10:47	D06	- 56	36	1.8	
10:50	D06	- 59	216	2.0	
10:52	D06	- 62	36	2.0	
10:55	D06	- 64	216	1.9	
10:58	D06	- 32	36	1.9	FILL GAP
11:01	D07	- 49	28	1.9	
11:04	D07	- 46	208	1.8	
11:09	D07	- 42	28	1.8	
11:13	D07	- 39	208	1.4	

Prepared by: ECO

GBA
MULTIBEAM SURVEY LOG

Date 8/20/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory PASSAIC2010MB | Echo Sounder Reson 8101

Matrix/LNW File D07/D08 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4902/3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
11:17	D07	- 36	28	2.0	D07 REACH
11:21	D07	- 33	208	1.4	
11:25	D07	- 29	28	2.0	
11:27	D07	- 25	208	1.6	
11:31	D07	- 22	28	1.9	
11:34	D07	- 19	208	1.7	
11:38	D07	- 17	28	1.7	
11:42	D07	- 15	208	1.8	
11:46	D07	- 42	28	1.3	FILL GAPS
11:47	D07	- 48	208	1.3	"
11:48	D07	- 14	28	2.0	
11:51	D07	- 17	208	1.3	FILL GAP
		SV CAST (C)		D08 -	11:55
12:07	D08	- 66	215	1.2	START D08 MB
12:09	D08	- 62	35	2.0	
12:05	D08	- 59	215	1.2	
12:07	D08	- 55	35	2.0	
12:09	D08	- 52	215		
12:11	D08	- 49	35	1.2	
12:13	D08	- 46	215	2.4	

Prepared by: BGC

GBA
MULTIBEAM SURVEY LOG

Date: 6/20/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: PASSAIC 2010 MB | Echo Sounder: Reson 8101

Matrix/LNW File: D08/D09/EO1 | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 5 | General Remarks:

People: 3 | HORZ/VERT CHECKIN — Time: 12:34 | RTK Tide: -0.10 | Tide Board: -0.15

S.O.S./Draft: 49.2/3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
12:15	D08 -	70	35	2.3	
12:18	D09 -	21	18	1.2	START D09 MID
12:20	D09 -	24	198	2.0	
12:21	D09 -	28	18	2.0	
12:22	D09 -	31	198	1.9	
12:23	D09 -	34	18	2.2	
12:24	D09 -	37	198	1.9	
12:26	D09 -	40	18	1.9	
12:27	D09 -	43	198	1.9	
	TIDE CHK @ 12:34 - NUTLEY ✓				START EO1
12:40	EO1 -	048	166	1.8	
12:44	EO1 -	051	346	2.2	POWER LINES N MID REACH
12:48	EO1 -	044	166	1.6	
12:52	EO1 -	059	346	1.8	WEDGE - E SIDE
12:55	EO1 -	062	166	1.9	
12:58	EO1 -	065	346	2.0	
13:00	EO1 -	068	166	2.2	
13:02	EO1 -	044	346	2.0	
13:05	EO1 -	041	166	1.7	
13:10	EO1 -	038	346	2.1	

Prepared by: BLC

GBA
MULTIBEAM SURVEY LOG

Date: 6/20/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: PASSAIC2010MB | Echo Sounder: Reson 8101

Matrix/LNW File: E01 | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 5 | General Remarks:

People: 3 | HORZ/VERT CHECKIN Time: RTK Tide: Tide Board:

S.O.S./Draft: 4912/3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
13:13	E01	034	166	2.0	
13:18	E01	031	346°	1.1	
13:20	E01	027	166	1.1	
13:23	E01	022	341		
13:25	E01	019	166	1.1	
	Switch		E02	middks	
13:29	E02	26	2°	1.1	
13:31	E02	23 (E029)	182°	1.1	
1333	E02	24	2°	1.1	
1334	E02	21	182°	1.1	
1335	E02	32	2°	1.1	
1337	E02	35	182°	1.1	
13:39	E02	040	2°	1.1	
13:40	E02	43	182°	1.1	
1342	E02	47	2°	1.2	
1344	E02	50	182°	1.2	
1345	E02	53	2°	1.1	
1347	E02	56	182°	1.2	
1349	E02	59	2°	1.1	
1350	E02	62	182°	1.1	

Prepared by: BGC

GBA
MULTIBEAM SURVEY LOG

Date 6/20/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 MB | Echo Sounder Reson 8101

Matrix/LNW File D05 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4908.5/3.4 | South of Belleville Bridge

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
13:59		D05_16	26°	1.1	Open Port
1400		D05_14	200	1.3	Open STBD
1402		D05_12	200°		Extends To D04 open STBD
1404		D05_55	26°	1.3	
1410		D05_59	200		
~~1413~~		~~D05_61~~	~~26°~~		~~Dropped KTE~~
1414		D05_61A	26°		
1416		D05_65	200°		
14:17		D05_66			Open STBD Beam 5
	14:26	SV Cast EOI			
		Switch To EOI			
~~14:~~		SV CAST @ EOI - 2:25			
14:31	EOI - 036		346	2.2	EOI - BANKS COSTRTK
14:35	EOI - 015		346	2.1	
14:36	EOI - 012		166	2.1	LOST RKT @ END (TRG)
14:39	EOI - 012		166	2.1	
14:42	EOI - 029		346	2.0	
14:44	EOI - 071		346	1.9	E. BANK
14:48	EOI - 072		166	1.96	
14:52	EOI - 073		346	2.0	

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date: 6/20/10 | Project ID #: 631-10A
Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: PASSAIC MB2010 | Echo Sounder: Reson 8101
Matrix/LNW File: E01/E02/E03/F01 | Positioning: POSMV 320 w/ Leica RTK
Average Boat Speed (kts): 4 | General Remarks:
People: 3 | HORZ/VERT CHECKIN
S.O.S./Draft: 4908.5/3.4 | Time: RTK Tide: Tide Board:

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
~~14:5~~	E01	~~074~~	~~166~~	2.0	
14:59	E02	060	1°	1.7	E02 - E BANK
15:01	E02	063	181	2.0	
15:03	E02	067	1	1.3	
15:04	E02	078	181	1.7	
15:05	E02	019	181	1.7	W. BANK
15:08	E02	016	1°	1.7	
15:12	E03	~~24~~	24°	1.9	E03. BANK (W)
15:13	E03	21	204	2.0	
15:15	E03	18	24	1.7	
15:16	E03	15	204	2.0	
15:19	E03	58	24	1.7	
15:20	E03	61	204	2.3	
15:22	E03	64	24	1.7	
15:24	E03	67	204	1.7	
15:25	E03	70	24	1.7	
15:28	F01	024	6°	1.7	E F01
15:31	F01	021	186	1.3	
15:35	F01	020	6	1.8	OPENED PORT BEAMS (JEEB)
15:37	F01	017	186	1.3	

Prepared by: BLC

GBA
MULTIBEAM SURVEY LOG

Date 6/20/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory PASSAIC2010MB | Echo Sounder Reson 8101

Matrix/LNW File F01/E03 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4908.5/3,4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
15:40	F01	- 014	6	2.3	
15:41	F01	- 011	186	1.3	
15:43	F01	- 54	186	2.1	E. BANK
15:46	F01	- 57	6	2.1	
15:49	F01	- 60	186	2.0	
15:53	F01	- 63	6	2.2	
15:56	F01	- 050	186	2.0	MID
15:59	F01	- 046	6	2.0	
16:02	F01	- 041	186	1.5	
16:04	F01	- 037	6	1.3	
16:08	F01	- 031	186	1.7	
16:11	F01	- 027	6	1.5	
16:16	E03	- 26	204	1.3	E03 - MID
16:18	E03	- 30	24	1.8	
16:19	E03	34	204		
16:20	E03	- 38	24	1.3	
16:21	E03	- 43	204		
16:22	E03	- 47	24	1.8	
16:23	E03	- 51	204	1.4	
16:24	E03	- 54	24	1.8	

Prepared by: BGC

GBA
MULTIBEAM SURVEY LOG

Date: 6/20/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: PASSAIC2010MB | Echo Sounder: Reson 8101

Matrix/LNW File: F02 | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 5 | General Remarks:

People: 3 | HORZ/VERT CHECKIN

S.O.S./Draft: /3.4

Time	RTK Tide	Tide Board
16:59	4.70	4.60

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
		switch	Reach	F02	
16:29		F02_53	358	1.4	
16:30		F02_56	178	1.6	
16:31		F02_57	358	1.4	
16:34		F02_62	178°	1.4	
16:35		F02_63	358	1.4	
16:37		F02_26	178°	1.4	
16:39		F02_21	358°	1.5	
16:40		F02_18	178	1.3	
16:42		F02_15	358	1.5	
16:43		F02_29	178	1.1	
16:45		F02_24	358	1.3	
16:47		F02_35	178°	1.0	
16:48		F02_39	358°	1.3	
16:50		F02_43	178°	1.3	
16:51		F02_47	358	1.4	
16:52		F02_51	178	1.4	
16:55	SV	Cast @ F02			
16:57	RTK	TIDE check @ Notley			
15:12	POSI	tion check @ GPO			

Prepared by: BGL

GBA
MULTIBEAM SURVEY LOG

Date 6/21/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 20105B | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks

People | HORZ/VERT CHECKIN

S.O.S./Draft 4903./1.2 | Time 8:10 RTK Tide 1.10 Tide Board 1.08

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
8:10		Tide & Position checks @ CPG			
8:30		Barcheck	5', 12', 10', 5'		
8:35		CROSS22	279	1.7	
8:36		22A	79°	1.5	
8:38		CROSS 23	274	1.3	
8:40		23A	94	1.3	CROSS24 accidently logged for 23
8:42		CROSS 24A	273	1.3	
8:42		24B	93	1.3	
8:45		CROSS 25	275	1.4	
8:46		25A	95	1.3	
8:48		CROSS 26	291	1.3	
8:48		CROSS 26A	101	1.3	
8:51		CROSS 27	103	1.3	
8:52		27A	283	1.3	
8:54		CROSS 28	288		
8:54		28A	288	1.3	
8:55		28B	108°	1.3	
8:57		CROSS 29	289	1.3	
8:58		29A	109	1.3	

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/22/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010SD | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4903/1.2

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
8:59		Cross 30	310	1.3	
9:00		30A	130	1.3	
9:02		Cross 31	335	1.3	
9:03		Cross 31A	155	1.3	
9:05		Cross 32	341	1.3	
9:06		32A	161	1.3	
9:07		Cross 33	343	1.3	
9:08		33A	163	1.4	
9:10		Cross 34	344	1.3	
9:11		34A	164	1.4	
9:13		Cross 35	338	1.3	
9:14		35A	158	1.3	
9:15		Cross 37	335	1.3	
9:16		37A	155	1.3	
9:18		Cross 38	318	1.4	
9:19		38A	138	1.1	
9:20		Cross 39	312	1.4	
9:21		39A	132	1.1	

Prepared by: SCD

GBA
MULTIBEAM SURVEY LOG

Date 6/21/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 SB | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4903 / 1.2

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
9:23		000-0923	S	1.4(2.6)	East shore twoen Bridges Trees
9:24		000_0924	N	1.4	center Line
9:26		000-0926	S	1.4	WEST Shore Trees
		Between Rail Bridge & Park Ave Bridge			
9:29		000-0929	S	2.4	East shore Trees
9:37		000_0937	N	2.3	CENTER LINE
9:46		000_0946	S	1.2/2.8	WEST BANK
		Barcheck			

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/21/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 m | Echo Sounder Reson 8101

Matrix/LNW File F01 / E01 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4910 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
10:08	F01	032	6°	1.7	
10:11	F01	029	186°	1.9	
10:15	F01	027	6	1.9	
10:18	F01	021	186	2.1	
10:21	F01	027	6	1.9	FILL GAPS
10:24	F01	035	186	1.9	
10:27	F01	038	6	1.9	
10:30	F01	041	186	1.9	
10:33	F01	045	6	2.1/1.9	
10:36	F01	048	186	2.1	
10:39	F01	050	6	2.1	
10:42	F01	053	186	2.0	
10:45	F01	055	6	2.0	~~FA~~
10:49	F01	056	186	2.0	FILL GAPS
10:51	F01	051	6	1.9	"
10:53	F01	032	186	2.3	"
10:57	E01	055	166	1.9	FILL GAPS
10:58	E01	028	346	1.9	"

Prepared by: BLC

GBA
MULTIBEAM SURVEY LOG

Date: 6/21/10 | Project ID #: 631-10A
Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: PASSAIC 2010 MB | Echo Sounder: Reson 8101
Matrix/LNW File: F03/F02/F04 | Positioning: POSMV 320 w/ Leica RTK
Average Boat Speed (kts): 5 | General Remarks:
People: 3 | HORZ/VERT CHECKIN
S.O.S./Draft: 49'4/3.4 | Time: RTK Tide: Tide Board:

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
11:03	F02	- 046	358		UNDER BRIDGE
11:05	F02	- 049	178	2.0	
11:06	F02	- 48	358	1.7	
11:08	F02	- 45	178	1.8	
11:12	F02	- 34	358	2.6	
11:14	F02	- 28	178	1.8	
11:16	F02	- 22	358	1.8	
11:17	F02	- 20	178	2.5	
11:19	F03	- 27	12	1.6	START F03 - MID
11:23	F03	- 25	192	1.7	
11:26	F03	- 22	12	1.7	
11:30	F03	- 34	192	1.9	
11:34	F03	- 37	12	1.9	
11:37	F03	- 40	192	2.0	
11:40	F03	- 43	12	1.9	
11:44	F03	- 46	192	2.0	
11:53	F03	- 40	12	1.2	FILL GAPS
11:56	F04	- 035	35	2.0	
11:57	F04	- 037	215		HYPACK CRASH
12:02	F04	- 037	35		RE-RUN

Prepared by: BAC

GBA
MULTIBEAM SURVEY LOG

Date 6/21/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory PASSAIC 2010MB | Echo Sounder Reson 8101

Matrix/LNW File F04/G01 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 49/4 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
12:03	F04	- 040	215	2.4	
12:04	F04	- 041	35	2.4	
12:06	F04	- 034	215	1.2	
12:08	F04	- 032	35	2.4	
12:10	F04	- 030	215	2.0	
12:11	F04	- 028	35	2.3	
12:13	F04	- 025	215	1.2	
12:15	F04	- 022	35	2.0	
12:16	F04	- 019	215		
12:17	F04	- 016	35	2.0	
12:19	F04	- 034	215	1.9	
12:20	F04	- 013	35	1.9	
	SV	CAST @ G01 - 12:20			49/7.3
12:28	G01	- 049	237°	2.1	START G01 - MID
12:29	G01	- 047	57	1.8	
12:31	G01	- 046	237	2.1/1.9	
12:32	G01	- 043	57	1.9	
12:33	G01	- 041	237	1.8	
12:34	G01	- 038	57	1.6	
12:35	G01	- 036	237	1.8	

Prepared by: BGC

GBA
MULTIBEAM SURVEY LOG

Date: 6/21/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: PASSAIC 2010M B | Echo Sounder: Reson 8101

Matrix/LNW File: G01 / G02 | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 5 | General Remarks:

People: 3 | HORZ/VERT CHECKIN — Time: RTK Tide: Tide Board:

S.O.S./Draft: 4917 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
12:37	G01	- 033	57°	1.8	
12:38	G01	- 031	237	2.0	
12:39	G01	- 028	57	1.6	
12:40	G01	- 026	237	1.9	
12:43	G02	- 050	74	1.7	HDOP SPIKE
12:48	G02	- 048	254	2.4	HYPACK CRASH
12:54	G02	- 048	74	2.0	RE-RUN
12:58	G02	- 042	254	2.0	
13:03	G02	- 041	94	2.1	
13:06	G02	- 039	254	2.0	
13:11	G02	- 037	74	2.2	
13:17	G02	- 036	254	2.3	
13:16	G02	- 031	74	1.1	
13:18	G02	- 039	254	1.1	
13:21	G02	- 052	74	1.1	
13:24	G02	- 039A	254	1.1	Gap Fills
13:27	G02	- 051	74°	1.1	
13:30	G02	- 055	254°	1.1	

Prepared by: BGC

GBA
MULTIBEAM SURVEY LOG

Date 6/21/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 MB | Echo Sounder Reson 8101

Matrix/LNW File 602 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks

People | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4910 / 34

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
13:34		602_057	74°	1.1	
13:36		602_060	254°	1.1	
13:40		602_053	74°	1.2	Gap fills
		switch	603		south of bridge
13:43		603_042	66°	1.2	upto Bridge Only
13:45		603_039	246°	1.5	
13:46		603_036	66°	1.2	
13:48		603_034	246	1.5	
13:49		603_031	66°	1.2	
13:50		603_043	246	1.3	
13:52		603_047	66°	1.2	
13:53		603_050	246°	1.2	
13:55		603_053	66°	1.1	
13:57		603_056	246	1.3	
13:58		603_060	66	1.5	south of Bridge
					north of Bridge
14:01		603_46	246	1.1	
14:03		603_44	246	1.1	
14:04		603_40	246	1.1	
14:06		603_38	246	1.1	

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/21/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 MB | Echo Sounder Reson 8101

Matrix/LNW File 0603 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) _____ | General Remarks _____

People 3 | HORZ/VERT CHECKIN

S.O.S./Draft 4.9/3.4 | Time 14:23 | RTK Tide 1.10 | Tide Board @ Wtfleg 1.16

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
14:08	603-	34	246	1.1	
14:11	603-	50A	246	1.2	
14:12	603-	55	246	1.3	worthy Bridge ↑
	~~603-~~	~~55~~	~~246~~	~~1.8~~	
14:23	TIDE check @ Wtfleg				
14:28	SV cast @ G3				
	under Bridges ↓				under Bridges
14:30	603-	38	246		
1434	603	42	66		
14:35	603	40	246		
14:36	603	44	66°		
14:38	603	56	246		
14:39	603	57	66°		
1442	604-	45	35		
14:43	604-	49	215		
1445	604-	53	35°		
1446	604-	57	215°		
1448	604	61	35		
1449	604	65	215°		
14 56	604	69	3		under Bridges

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/21/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory PASSAIC2010MB | Echo Sounder Reson 8101

Matrix/LNW File F01/F03/F04 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 4 | General Remarks

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4918.6/3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
15:09	F01 -	056	6	1.7	
15:11	F01 -	060	186	1.7	
15:14	F01 -	064	6	1.7	OPENED STBD BEAMS - WALL/BANK
15:18	F01 -	020	186	2.0	
15:21	F01 -	019	6	1.9	
15:24	F01 -	014	186	2.4	
15:30	F03 -	48	12	2.0/1.6	F03 - BANKS
15:34	F03 -	051	192	2.2	
15:38	F03 -	55	12	2.2	HYPACK CRASH
15:43	F03 -	55	192	1.4	RE-RUN
15:47	F03 -	58	12	2.0	
15:50	F03 -	60	192	2.0	N-END
15:54	F03 -	23	12	1.3/2.0	
15:58	F03 -	29	192	2.1	HEAVY TREES - CAN'T GET CLOSER
16:02	F03 -	16	12	2.1	
16:07	F04 -	010	35	2.1	F04 - BANKS
16:09	F04 -	008	215	1.3	
16:11	F04 -	041	35	1.8	

Prepared by: BGC

GBA
MULTIBEAM SURVEY LOG

Date: 6/21/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: PASSAIC 2010 MB | Echo Sounder: Reson 8101

Matrix/LNW File: F04/G01/G02 | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 4 | General Remarks:

People: 3 | HORZ/VERT CHECKIN

S.O.S./Draft: 4918.6/3.4 | Time: RTK Tide: Tide Board:

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
16:13	F04	- 044	215	1.8	
16:15	F04	- 048	35	1.6	
16:17	F04	- 050	215	1.8	
16:19	F04	- 054	35	1.7	
16:20	F04	- 052	215	2.5	
16:23	G01	- 051	57	1.4	
16:24	G01	- 054	237	1.6	
16:25	G01	- 058	57	1.3	
16:26	G01	- 062	237	2.5	
16:27	G01	- 024	57	1.4	
16:28	G01	- 021	237	2.6	
16:31	G02	- 026	74	1.4	
16:36	G02	- 027	254	2.6	TREES - HYPACK CREEK
16:41	G02	- 024	74	1.5	
16:47	G02	- 026	254	1.6	
16:49	G02	- 065	254	1.9	
16:53	G02	- 059	74	2.2	
16:57	G02	- 067	254	1.4	TREES - E. BANK

Prepared by: BGC

GBA
MULTIBEAM SURVEY LOG

Date: 6/21/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: | Echo Sounder: Reson 8101

Matrix/LNW File: 602/603 | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 4 | General Remarks:

People: 3 | HORZ/VERT CHECKIN Time: RTK Tide: Tide Board:

S.O.S./Draft: 498.6/3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
17:02	602	-064	74	2.1	
17:04	602	-068	254	2.2	
17:07	602	-057	74	2.2	
17:12	603	-63	24	2.0	
17:13	603	-67	246	1.4	TREES
17:14	603	-70	24	2.3	"
17:16	603	-73	246	1.2	
17:17	603	-26	24	2.0	
17:19	603	-23	246		
17:22	603	-32	246	1.4	
17:23		-28	24°	1.2	
17:23		-26	246°	1.2	
17:25		-19	24	1.2	
17:26		-22	246	1.2	
17:27		-28	246		
17:27		20	246		
1728	603	18	24	1.2	
	603	57	246		
	603	62	24	1.3	open STBD Beams

Prepared by: BGC

GBA
MULTIBEAM SURVEY LOG

Date 6/21/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 MB | Echo Sounder Reson 8101

Matrix/LNW File G04 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) _____ | General Remarks _____

People 3 | HORZ/VERT CHECKIN Time _____ RTK Tide _____ Tide Board _____

S.O.S./Draft 4.17 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
17:33	G04	33	35	1.2	
17:35	G04	30	215	1.2	
17:36	G04	29	35	1.2	
17:39	G04	31	215	1.3	
17:40	G04	28	35°	1.3	
17:41	G04	23	215	1.3	
17:43	G04	52	35	1.7	Do not use
17:44	G04	52A	35°	1.3	
17:46	G04	55	215°	1.6	
17:48	G04	58	35°	1.6	
17:50	G04	61	215°	1.6	
	G04	64	35°	1.0	open STBD Beams
1753	G04	72	215		open Port Beams
1755	G04	75	35		open STBD Beams
1757	G04	51	215	1.6	
1759	G04	47	35	1.0	
	G04	49	~~215~~		
1803	G04	37	35	1.0	
1805	G04	40	215	1.6	

Prepared by: E C

GBA
MULTIBEAM SURVEY LOG

Date 6/21/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks

People | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
18:09	604-45A		215	1.0	
1810	604 42		215	1.0	
1812	604-39		215	1.0	
1813	604-36		215	1.0	
1814	604-33A		215	1.0	
1816	604-30		215	1.0	
1818	604-68		215	1.2	
1819	604 67		215	1.2	
1821	604 69A		215	1.1	
1822	604 60		215	1.8	
1824	604-56		215	1.1	
1825	604 61C		215	1.0	
18:26	SV cast @ 604				

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/22/2010 — Project ID # 631-10A

Vessel Name Sea Fix — Description Passaic River Multibeam

Raw Data Directory Passaic 2010SD — Echo Sounder Reson 8101

Matrix/LNW File ULPR crosslines — Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) ____ — General Remarks ____

People ____ — HORZ/VERT CHECKIN

S.O.S./Draft 4903/1.2 — Time 7:35, RTK Tide 2.60, Tide Board 2.59

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	07:45	Barcheck		5', 15', 10' 5'	
7:49		cross 40	288	1.3	
7:50		40A	108	1.5	1P Port wade Trees
7:52		Cross 41	284	1.6	
7:53		41A	104	1.6	
7:55		Cross 42	284	1.6	
7:55		42A	104	1.6	
7:58		cross 43	282	1.7	
7:58		43A	102	1.7	
8:00		cross 44	293	1.1	
8:01		44A	103	1.7	
8:03		cross 45	281	1.7	
8:04		45A	101	1.7	
8:05		CROSS 46	273	1.7	
8:06		46A	93	1.7	
8:07		CROSS 47	260	1.8	
8:08		47A	80	1.7	
8:10		CROSS 48	242	1.7	
8:10		48A	62	1.7	

Prepared by: ECO

GBA
MULTIBEAM SURVEY LOG

Date 6/22/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic SB | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4903 / 1.2

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
9:12		CROSS-49	258	1.7	Hi PDOPS under bridges
9:13		49A	78	1.7	
9:15		CROSS 50	255	1.2	
9:15		50A	75	1.6	
9:17		CROSS 51	239	1.6	
9:18		51A	59	1.6	
9:19		CROSS 52	266	1.0	
9:20		52A	86	1.6	
9:21		CROSS 53	300	1.2	
9:23		53A	120	1.5	
9:24		CROSS 54	259	1.5	
9:24		54A	119	1.5	
	Long Lines		Bridge to bridge		
9:26		000_0825	—	1.7	East shore (away from trees)
9:36		000_0836	—	1.5	CENTER LINE
9:49		000_0849	—	2.1	WEST SHORE
		BAR CHECK @ 9:05 → 5, 10, 15			
		SV CAST @ 9:08, HOL			

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/22/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory PASSAIC2010MB | Echo Sounder Reson 8101

Matrix/LNW File H01/H02 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 4918.B/3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
9:11	H01 -	54	13°	1.4	START H01 - MID
9:17	H01 -	50	193°	1.4	
9:21	H01 -	57	13		
9:27	H01 -	47	193		
9:31	H01 -	44	13	2.2	
9:37	H01 -	41	193		
9:41	H01 -	38	13	1.2	
9:46	H01 -	35	193	1.9	
9:50	H01 -	32	13	2.0/1.8	
9:57	H02 -	23	2°	1.9	START H02 - MID
9:59	H02 -	20	182°	1.9	
10:01	H02 -	26	2	1.9	
10:04	H02 -	29	182	1.2	
10:06	H02 -	32	2	2.1/1.9	
10:09	H02 -	35	182	1.9	
10:11	H02 -	39	2	1.9	
10:14	H02 -	42	182	2.1	TREE - SHORT HDOP SPIKE
10:	H02 -	30	2	1.9	FILL GAP

Prepared by: BGC

GBA
MULTIBEAM SURVEY LOG

Date 6/22/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory PASSAIC 2010MB | Echo Sounder Reson 8101

Matrix/LNW File H03/H04 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN

S.O.S./Draft 4918.3/3.4 | Time RTK Tide Tide Board

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
10:18	H03	-22	332	1.9	
10:21	H03	-19	152	1.9	
10:23	H03	-16	332	2.1	
10:25	H03	-14	332	2.1	
10:26	H03	-13	152	2.2	FILL GAP
10:27	H03	-25	332	1.9	
10:30	H03	-28	152	1.6	FLOATING HDOP - TREES
10:32	H03	-31	332	1.6	"
10:34	H03	-34	152	1.6/2.1	"
10:36	H03	-37	332	2.1	"
10:38	H03	-41	152	1.5	"
10:40	H03	-44	332		"
10:43	H04	-30	344	2.0	
10:45	H04	-32	164	2.3	
10:47	H04	-36	344		
10:49	H04	-38	164		
10:51	H04	-41	344		NEAR TREES - HDOP ↓↑
10:53 10:55	H04 HTM	-47 27	344		
10:58	H04	-23	164	1.6	

Prepared by: BGC

GBA
MULTIBEAM SURVEY LOG

Date 6/22/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory PASSAIC2010 MB | Echo Sounder Reson 8101

Matrix/LNW File H04/H05/H06 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN

S.O.S./Draft 4918.3/3.4 | Time | RTK Tide | Tide Board

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
11:00	H04 - 20		344	1.6	
11:02	H04 - 16		164		TIDES
		SV CAST	C 11:05	- 4921.6	
11:09	H05 - 33		338		START H05 - MID
11:11	H05 - 36		158	1.6	
11:13	H05 - 38		338	2.0/1.7	
11:16	H05 - 42		158	1.6	
11:17	H05 - 44		338		
11:19	H05 - 47		158	1.6/1.9	TIDES
11:20	H05 - 30		158	1.9	
11:22	H05 - 27		338		
11:25	H05 - 24		158	1.7	
11:27	H05 - 20		338		TIDES - HDOP ↑↓
11:29	H05 - 18		158	1.9	
11:32	H05 - 15		338		LOST RTK
11:33	H05 - 43		158	2.8	
11:34	H05 - 43		338	1.9	
	H06				H06 - MID

Prepared by: BGC

GBA
MULTIBEAM SURVEY LOG

Date 6/22/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory PASSAIC 2010MB | Echo Sounder Reson 8101

Matrix/LNW File 4921.6 / 2.4 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN

S.O.S./Draft H06/H07 | Time RTK Tide Tide Board

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
11:38	H06	43	5°	1.3	
11:40	H06	46	185°	2.7	TREES
11:41	H06	40	5°		
11:42	H06	38	185		
11:43	H06	35	5	1.8	
11:44	H06	32	185	1.8	
11:45	H06	29	5		
11:46	H06	26	185	1.8	
11:48	H06	23	5	2.6	
11:49	H06	20	185	1.8	
11:51	H06	17	5	2.6	TREES
11:52	H06	14	185	1.8	
11:54	H07	39	28	2.5	NO MATRIX
11:56	H07	39	28	1.2	RE-RUN
11:58	H07	36	208	2.4	BRIDGE & TREES - HDOP ↑
12:00	H07	42	28	2.4	cc
12:01	H07	33	208	1.5/2.4	
12:03	H07	30	28	2.4	
12:05	H07	27	208	1.5	

Prepared by: BGC

GBA
MULTIBEAM SURVEY LOG

Date 6/22/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory PASSAIC2010MB | Echo Sounder Reson 8101

Matrix/LNW File H07 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN

S.O.S./Draft 4921.6/3.4

Time	RTK Tide	Tide Board
12:34	-1.39	-1.46

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
12:06	H07	-24	28	2.0	
12:08	H07	-21	208	1.5	
12:09	H07	-18	28	2.3	
12:11	H07	-15	208	1.9	TREES - HDOP UP
12:12	H07	-12	28	2.3	" "
12:17	H07	-40	28	2.2	UNDER BRIDGE - LOST RTK
12:18	H07	-40	208	2.2	
12:20	H07	-37	28	2.2	
~~12:~~	~~H07~~	~~-34~~	208		
	12.34	RTK	TIDE	check	@ CPG
12:38	H07	-34	208		
12:40	H07	-31	28		
12:42	H07	-30A	208		under Bridge
		North of Bridge			
12:45	H07	-27A	208	1.2	High DOPS
12:47	H07	-30B	28°	1.	
	SV CAST @ H07		12:09	-4933.4	

Prepared by: BAL

GBA
MULTIBEAM SURVEY LOG

Date 6/22/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory PASSAIC2010MB | Echo Sounder Reson 8101

Matrix/LNW File H07/H08 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) 5 | General Remarks

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft 49334 ~~4921.6~~ / 3.4 | ~~1314~~

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
13:14		H07-30C	208	1.7	
13:15		H07-30D			
13:16		H07-27B	208	1.2	
13:18		H07-27C	208	1.2	
13:20		H07-29	208°	1.2	
13:21		H07-21	28°	1.2	
13:23		H07-18A	208	1.1	
13:24		H07-15A	28°		
1325		H07-12A	208		
1326		H07-07A	28°	1.1	
1328		H07-33A	208	1.2	
1329		H07-36A	28°	2.7	
		SWL/TCA	H08		
13:30		H08-45	90	1.5	
13:34		H08-42	189°	2.1	
13:38		H08-39	9	1.5	
13:41		H08-37	189	2.2	
13:46		H08-34	9	2.3	
13:49		H08-31	189	1.1	
13:52		H08-28	9	1.3	

Prepared by: EcO

GBA
MULTIBEAM SURVEY LOG

Date: 6/22/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: PASSAIC 2010 MB | Echo Sounder: Reson 8101

Matrix/LNW File: H08/ | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 5 | General Remarks:

People: 3 | HORZ/VERT CHECKIN Time: RTK Tide: Tide Board:

S.O.S./Draft: 493.4/3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
13:56		H08-25	189	2.3	
14:00		H08-22	9	1.8	
14:05		H08-19	189		
14:08		H08-16	9		
14:12		H08-48	189		LOST RTK
14:13		H08-48A	189	3.3	RERUN LOST RTK
14:17		H08-44	9	2.0	LOST RTK
14:18		H08-44A	9	1.8	RERUN - LOST RTK
14:19		H08-44B	9	1.7	" "
14:19		H08-41	9	1.7	FILL GAPS
14:23		H08-47	189	2.0	HDOP SPIKES - TREES
14:30		H09-39	180	2.1	START H09 - MID
14:33		H09-36	198	2.0	
14:36		H09-42	18	1.9	
14:40		H09-33	198	1.6	
14:44		H09-31	18	2.1	
14:48		H09-28	198	1.7	
14:51		H09-25	18	2.0	
14:54		H09-22	198	0.8	

Prepared by: BLC

GBA
MULTIBEAM SURVEY LOG

Date 22 June 2010 | Project ID # 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: Passaic 2010 MB | Echo Sounder: Reson 8101

Matrix/LNW File: H09 | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): | General Remarks:

People: 3 | HORZ/VERT CHECKIN — Time | RTK Tide | Tide Board

S.O.S./Draft: 4933 // 3.0 M / 1.25

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
14 58	H02	20	18°	0.8	
15 02	H09	A	198	1.1	
1503	H09	14	18°	2.3	
1504	H09	43	198°	1.0	
1509	H09	47	19°	0.8	
15:15	H09	19	198°	0.8	
15:19	SV	Cast	H09		
15:20	Barcheck				
15:26		Cross G2	280	1.2	
15:27		G2A		1.4	
15:28		Cross G1	285		
15:29		G1A	105°		
15:32		Cross G0	291	1.3	
15:33		G0A	109	1.2	
15:35		Cross 55	288	1.2	
1536		55A	108	1.1	
15 38		Cross 58	282	1.4	
1539		58	102	1.4	
1540		Cross 57	279	1.4	
1541		57A	99	1.4	

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date	June 22 2010	Project ID #	631-10A
Vessel Name	Sea Fix	Description	Passaic River Multibeam

Raw Data Directory	Passaic 2010SB	Echo Sounder	Reson 8101
Matrix/LNW File	H01	Positioning	POSMV 320 w/ Leica RTK
Average Boat Speed (kts)	5	General Remarks	
# People	3		
S.O.S./Draft	4939 / 1.2 4994.6/3.4		

HORZ/VERT CHECKIN

Time	RTK Tide	Tide Board

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
1512		CROSS 56	277		
1543		56A	97°		
1545		CROSS 55			
1548		1547 EAST LONG			
1554		1554 CENTER			
1601		1601 WEST LONG			
16:05		Bar check			
	MultiBeam Edges - SV CAST - 4922.6				
16:24		H01-60	13°	1.4	START H01 EDGES
16:29		H01-31	193°	2.6/1.8	
16:34		H01-28	13	1.3	OPEN PORT BEAMS - CANT GET CLOSE
16:40		H01-62	193	2.9/1.3	
	Hit mb head on Rock				
	check for any changes to Head Config				
	Roll Test shows nb to -2.30° from -2.50				

Prepared by: BK

Page 11 of 14

GBA
MULTIBEAM SURVEY LOG

Date: 6/22/10
Vessel Name: Sea Fix
Project ID #: 631-10A
Description: Passaic River Multibeam

Raw Data Directory: PASSAIC2010MB
Matrix/LNW File: ~~[illegible]~~
Average Boat Speed (kts): 5
People: 2
S.O.S./Draft: 4922.6/3.4

Echo Sounder: Reson 8101
Positioning: POSMV 320 w/ Leica RTK
General Remarks:
HORZ/VERT CHECKIN
Time | RTK Tide | Tide Board

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
17:15		H02_17	3°	1.2	
17:1[illegible]		H02_14	1[illegible]°	1.2	open STBD beams
17:20		H02_11	~~[illegible]~~ 335		open Port side
17:22		H0_12	~~[illegible]~~ 3°	[illegible]	
17:24		H02_09	183°		USE
17:25		H02_45	183		open Port side
17:2[illegible]		H02_47		1.3	open STBD side beams
1732		H03_46	332		open STBD Tide 4.74
1734		H03_48	152	1.3	open Port
1736		H03_17A	332	1.6	open Port
1737		H03_[illegible]	152	1.6	open STBD
1742		H03_15	332	2.3	
1745		H04_18	344	1.3	
1748		H04_14	~~[illegible]~~ 164	1.4	open Port
1750		H04_48	344	1.4	open STBD
1752		H04_50	164	1.4	open ~~[illegible]~~ Port
1754		H04_48	344	1.8	open STBD
17:57		H05-44	338	1.3	
18:00		H05-46	158	2.5	

Prepared by: ECD

Page 12 of 14

GBA
MULTIBEAM SURVEY LOG

Date: 6/22/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: PASSAIC2010 MB | Echo Sounder: Reson 8101

Matrix/LNW File: H05/H06/H07/H08 | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 5 | General Remarks:

People: 3 | HORZ/VERT CHECKIN Time / RTK Tide / Tide Board

S.O.S./Draft: 4922.6/3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
18:02	H05	- 49	338	1.7	TREES
18:04	H05	- 12	158	1.9	TREES - W. BANK
18:10	H06	- 49	5°	2.3	
12:12	H06	- 51	185	1.2	
18:14	H06	- 10	5	2.2	
18:16	H06	- 08	185	1.6	
18:19	H07	- 10	28	2.2	OPEN PORT BEAMS - CRANE TREES
18:21	H07	- 43	208	2.2	E. BANK
	H08	-	28	1.2	
18:26	H07	- 43	208	1.9	
18:28	H07	- 45	208	2.2/1.9	
18:31	H07	- 09	208	1.8	
18:34	H07	- 06	208	1.8	
18:35	H08	- 16	9°	1.8	OPEN PORT BEAMS - CONC. WALL
18:41	H08	- 14	189	1.7	OPEN STBD BEAMS
18:46	H08	- 47	9°	2.0	E. BANK

Prepared by: B.C

GBA
MULTIBEAM SURVEY LOG

Date 6/22/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 MB | Echo Sounder Reson 8101

Matrix/LNW File H08 | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks

People 3 | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft [illegible]

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
18:19		H08_50	89	1.0	
18:53		H08_53	9	1.0	
18:[illegible]		H08_49	180	0.9	[illegible]
18:02		H08_[illegible]	16°	2.1	[illegible]
19:[illegible]		[illegible]	18°		
19:06		H09_[illegible]	179°		[illegible]
19:02		H09_[illegible]	185°	1.1	
19:10		H09_[illegible]	17		
19:13		H09_19A	189°	1.1	
19:17		H09_13	18°	1.2	
19:52		H09_13A	181°	1.3	[illegible]
19:[illegible]		H09_11	185°	1.3	

Prepared by: [illegible]

GBA
MULTIBEAM SURVEY LOG

Date: 6/23/ | Project ID #: 631-10A
Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: Passaic 2010 MB | Echo Sounder: Reson 8101
Matrix/LNW File: H10/H11 | Positioning: POSMV 320 w/ Leica RTK
Average Boat Speed (kts): 4 | General Remarks:
People: 2 4

HORZ/VERT CHECKIN

Time	RTK Tide	Tide Board
6:27	3.48	3.51

S.O.S./Draft: 4914.4/3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	6:27	Tide & Position check @ CPG Dock			
	6:31	SV cast @ H10			
6:37	~~6:37~~	H10-38	4°	2.4/1.2	
6:39		H10-40	184	1.8/1.6	
6:41		H10-43	4	1.3	
6:43		H10-45	184	1.8	TREES - HDOP ↑↓
6:45		H10-49	4	1.7	" "
6:47		H10-51	184	2.8	LOST RTK
6:48		H10-53	184	2.4	TREES
6:50		H10-15	4	2.4/1.6	W. BANK
6:52		H10-12	184	1.7	WALL - OPEN STBD
6:55		H10-11	4	2.3	TREES/WALL - OPEN PORT
6:58		H11-16	346	1.6	
6:59		H11-19	166	2.8/1.5	
7:01		H11-14	346	1.6	
		H11-24			RTK HDOP TOO HIGH
7:03		H11-41	346	1.4	
7:06		H11-43	346	2.1	

Prepared by: ECO

GBA
MULTIBEAM SURVEY LOG

Date: 6/23/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: PASSAIC2010MB | Echo Sounder: Reson 8101

Matrix/LNW File: H11/H12 | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 4 | General Remarks:

People: 4 | HORZ/VERT CHECKIN Time: RTK Tide: Tide Board:

S.O.S./Draft: 4914.4/3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
7:08		H11.45	346	1.6	TREES
7:11		H11-40	166	1.5/1.7	
7:12		H11-42	346	1.7	
7:13		H11-44	166	1.5/2.7	
7:14		H11-46	346	1.4	
7:16		H11-17	166	1.9	LOST RTK
7:17		H11-17	166	1.5/3.2	HEAVY TREES - "
9:		H11-17	166		BAD SATS - RUN LATER
7:20		H12-34	10	1.4	
7:23		H12-37	190	1.4	
9:27		H12-39	10°	1.3	
9:30		H12-41	190°	1.3	
9:34		H12 43	10°	1.4	
9:36		H12 45	190°	1.4	
9:38		H12 26	10°	1.4	
9:41		H12-19	190°	1.4	
9:45		H12-20	10°	1.7	
9:48		H12 22	190	1.6	
9:53		H12-24	10°	1.6	

Prepared by: BHC

GBA
MULTIBEAM SURVEY LOG

Date: 6/23/10 | Project ID #: 631-10A

Vessel Name: Sea Fix | Description: Passaic River Multibeam

Raw Data Directory: PASSAIC2010MB | Echo Sounder: Reson 8101

Matrix/LNW File: H12/ | Positioning: POSMV 320 w/ Leica RTK

Average Boat Speed (kts): 4-5 | General Remarks:

People: 4 | HORZ/VERT CHECKIN Time: RTK Tide: Tide Board:

S.O.S./Draft: 4910.4 / 3.4

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
7:59		H12-29	190	2.1	
8:03		H12-31	10	1.7	HDOP SPIKES + LOST RTK
8:04		H12-08	190	2.1	
8:07		H12-30	10	1.7	
8:09		H12-22	190	2.1	
8:12		H12-45	10	1.6	
8:14		H11-19	166	1.6	
8:15		H11-22	346	1.6	
8:16		H11-18	166	1.6	
8:17		H11-20	346	3.4	
8:18		H11-16	166	1.6	
8:19		H11-18	346	1.5	
8:20		H11-33	166	1.5	
8:21		H11-37	346	1.7	
8:24		H11-23	346	2.1	
8:26		H11-27	166	1.5/2.1	
8:27		H11-31	346	2.1	
8:29		H11-35	166	1.5/2.1	
8:30		H11-38	346	2.1	

Prepared by: BFC

GBA
MULTIBEAM SURVEY LOG

Date: 6/23/10
Vessel Name: Sea Fix
Project ID #: 631-10A
Description: Passaic River Multibeam

Raw Data Directory: PASSAIC2010MB
Matrix/LNW File: H10
Average Boat Speed (kts): 5
People: 4
S.O.S./Draft: 4914.4/3.4

Echo Sounder: Reson 8101
Positioning: POSMV 320 w/ Leica RTK
General Remarks:
HORZ/VERT CHECKIN
Time | RTK Tide | Tide Board

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
8:33		H10-18	184	2.3	
8:35		H10-22	4	1.4	
8:37		H10-26	184	2.1	
8:38		H10-30	4	2.1	
8:39		H10-34	184	2.1/1.3	
		~~H10~~			
8:43		H11-41	346		BRIDGE LINES
8:44		H11-46	166	2.1	UNDER BRIDGE
8:45		H11-~~29~~27	346	2.1	BAD RTK HDOP
8:47		H11-23	166	2.3	
8:47		H11-18	346	2.5	
		~~08~~			
8:55		Barcheck @ ~~#4~~			
8:57		cross 63	272	1.3	
8:58		63A	92	1.3	
9:00		cross 64	257	1.3	
9:00		64A	77	1.3	
9:03		cross 65	253	1.4	
9:05		65A	73	1.4	

Prepared by: BKC

GBA
MULTIBEAM SURVEY LOG

Date 6/23/2010 | Project ID # 631-10A
Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 20105B | Echo Sounder Reson 8101
Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK
Average Boat Speed (kts) | General Remarks
People | HORZ/VERT CHECKIN Time RTK Tide Tide Board
S.O.S./Draft 4939 1 2

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
9:06		cross 66	291		
9:07		66A	111		
9:08		Cross 67	294		
9:09		67A	104		
9:12		Cross 68	287		
9:13		68A	107		
9:14		Cross 69	312		
9:15		69A	132		
	Long lines				North of Bridge
9:16		000_0916			East Bank
9:20		000_0920			Center Line
9:23		000_0923			West Bank
	Long lines				South of Bridge
9:28		000_0928			West Bank
9:30		000_0930			Central
9:32		000_0932			East Bank
9:59		HO_36	4°		MR Gap Filling

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/23/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic Patch MB | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks Closing Patch & Performance

People 3 | HORZ/VERT CHECKIN Time | RTK Tide | Tide Board

S.O.S./Draft

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	ROLL Test 2010				Reson 75 u.s
	001 - 1203		N	1.2	-2.40, -2.35 50m Rage
	001	1204	S		
	002 - 1206		N	1.2	-2.30, -2.40
	002 - 1207		S		
	003 - 1208		N	1.2	-2.35, -2.40
	003 - 1209		S		
		Pitch & Yaw 3			
	001 - 1230			↓	
	001 - 1231			↑	
	002 - 1234			↓	
	002 - 1235			↑	
	003 - 1236			↓	
	003 1237			↑	
	004 - 1239			↓	
	004 - 1240			↑	
	005 - 1242			↓	
	005 - 1243			↑	

Prepared by:

GBA
MULTIBEAM SURVEY LOG

Date 6/23 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010 Perf | Echo Sounder Reson 8101

Matrix/LNW File Performance | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) _____ | General Remarks _____

People _____ | HORZ/VERT CHECKIN Time RTK Tide Tide Board

S.O.S./Draft _____

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
		Leica. Performance	MB (ant ht 7.40)		
1253	001	1253			
1255	002	1255			
1256	003	1256			
1258	004	- 1258			
1259	005	- 1259			
	006	- 1300	Do not use		
1301	007	- 1301			
1302	009	- 1302			
13:03	010	- 1303			
13:04	011	- 1304			
13:05	12	13:05			
13:07	000	- 13:07			Beam may be fluctuated
13:05	003	13:05			Beam Angle

Prepared by: _____

GBA
MULTIBEAM SURVEY LOG

Date 6/23/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory _____ | Echo Sounder Reson 8101

Matrix/LNW File _____ | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) _____ | General Remarks GRA Performance MB

People 3 | HORZ/VERT CHECKIN Time _____ RTK Tide _____ Tide Board _____

S.O.S./Draft ~ _____

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
		001 - 1315	N		
		002 - 1317	S		
		003 - 1318	N		
		004 - 1319	S		
		005 - 1320	N		
		008 - 1322	E		
		009 - 1323	W		
		010 - 1324	E		
		011 - 1325	W		
		012 - 1326	E		
		010 - 1328	W		
		003 - 1330	N		

Prepared by: GCO

GBA
MULTIBEAM SURVEY LOG

Date 6/23/10 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory SR | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks Performance GBA

People | HORZ/VERT CHECKIN Time | RTK Tide | Tide Board

S.O.S./Draft 4964 / 1.2

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	13:30	Barcheck @ 5', 45', 30', 15', 5'			
		001 1339	S		
		002 1341	N		
		003 - 1342	S		
		004 - 1343	N		Boat waked!
		004 1344	S		
		005 - 1345	N		
		008 - 1347	SE		
		009 - 1348	W		
		010 - 1349	E		
		011 - 1350	W		
		012 - 1351	E		

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/23/2010 — Project ID # 631-10A

Vessel Name Sea Fix — Description Passaic River Multibeam

Raw Data Directory _____ — Echo Sounder Reson 8101

Matrix/LNW File _____ — Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) _____ — General Remarks SR Rev Formats Leica

People _____ — HORZ/VERT CHECKIN Time _____ RTK Tide _____ Tide Board _____

S.O.S./Draft _____

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
		001 - 1355	S		
		002 - 1356	N		
		003 - 1357	S		
		004 - 1358	N		
		005 - 1400	S		
		006 - 1401	E		
		011 - 1402	W		
		010 1403	E		
		009 - 1404	W		
		008 - 1405	E		
		Backlect	45', 30', 15', 5'		

Prepared by: _____

GBA
MULTIBEAM SURVEY LOG

Date 6/23/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory Passaic 2010MB | Echo Sounder Reson 8101

Matrix/LNW File | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) | General Remarks Cleanups

People | HORZ/VERT CHECKIN

S.O.S./Draft | Time 16:33 | RTK Tide 2.95 | Tide Board 3.00

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
	16:33	- TIDECheck	@ Port		
	16:35	- Sound Cast	@ A08		
1639	A08	116	296	1.4	up to RR Bridge
1642	A08	113	116°	1.2	
1644	A08	110	296	1.2	
1646	A08	107	116	1.4	
1648	A08	105	296°	1.4	
1650		101	296	1.4	
1653	A08	116A	296°	1.4	
1655	A08	121	116	1.2	
1657	A08	124	296°	1.2	
1659	A08	127	116	1.2	
1701	A08	130	296°	1.2	
1702	A08	134	116	1.2	
1704	A08	139	296	1.2	
1706	A08	144	116	1.2	
1708	A08	148	296°	1.2	
1710	A08	154	296	1.2	
1712	A08	161	296°		

Prepared by: ECD

GBA
MULTIBEAM SURVEY LOG

Date 6/23/2010 | Project ID # 631-10A

Vessel Name Sea Fix | Description Passaic River Multibeam

Raw Data Directory _____ | Echo Sounder Reson 8101

Matrix/LNW File _____ | Positioning POSMV 320 w/ Leica RTK

Average Boat Speed (kts) _____ | General Remarks _____

People _____ | HORZ/VERT CHECKIN

S.O.S./Draft _____

Time	RTK Tide	Tide Board
17:55	4.12	4.10

UTC Time	MB RNG	File	Line AZ	HDOP	Remarks
1713	A08	166	116	1.2	
1715	A08	170	296	1.3	
1717	A08	173	116	1.2	
1719	A08	176	296	1.2	
1722	A08	179	116	1.2	
1724	A08	182	296	1.2	
1731	A05	127	90°85°	1.2	
1733	A05	129A	189°	1.2	Restart
1739	A05	129B	90	1.3	
		Bar check 5' 20', 10',			
		Single Beam check Lines			
17:53		0091	207°	1.6	
17:54		0091A	27°	1.6	
17:56		0088	216	1.0	
17:56		0088A	36°	1.0	
18:00		0091B	207°	1.0	
19:15		Position	check @ Dock		

Prepared by: SCM

Sound Velocity Profile Logs

Date	Time	Northing	Easting	Desc
06/09/10	17:40:32	685002.21	596870.48	
06/10/10	9:18:26	685072.07	596920.58	A02
06/10/10	11:01:43	686604.83	596713.39	A03
06/10/10	14:18:37	689003.30	597225.35	A04
06/10/10	18:10:19	689410.07	597429.10	A04
06/11/10	8:20:27	686524.83	596873.81	A02
06/11/10	11:14:39	690879.40	597785.47	A05
06/11/10	14:33:20	693991.17	598261.55	A07
06/11/10	15:28:49	695239.05	597539.83	A07
06/12/10	8:52:54	690989.83	597781.39	A05
06/12/10	10:20:28	693474.39	598340.61	A06
06/12/10	11:20:06	694819.77	597951.75	A08
06/12/10	12:49:16	695665.35	596312.63	B01
06/12/10	14:03:59	695529.40	594812.48	B01
06/13/10	7:31:56	695143.36	597623.14	A08
06/13/10	9:42:28	695717.11	595209.44	B01
06/13/10	11:25:11	695544.01	595009.15	B02
06/13/10	12:50:50	695347.64	593181.81	B03
06/13/10	14:05:41	695312.61	593343.82	B03
06/15/10	7:40:48	694427.71	591277.64	B04
06/15/10	10:13:01	694766.24	591715.78	B03
06/15/10	11:34:17	693005.21	590571.96	B05
06/15/10	13:38:24	692370.98	589611.44	B06
06/15/10	15:03:52	693212.45	590708.66	B05
06/16/10	7:47:17	692500.71	586791.90	B07
06/16/10	8:55:49	692474.73	586855.41	B08
06/16/10	10:39:54	693661.57	585662.80	C01
06/16/10	11:53:21	693531.69	585789.71	C02
06/16/10	12:15:55	693537.28	585789.18	C01
06/17/10	8:34:11	696813.92	584736.40	C03
06/17/10	9:33:38	697817.76	584785.45	C04
06/17/10	12:50:20	701447.34	585317.62	C06
06/17/10	14:26:04	702511.16	585818.65	C08
06/17/10	15:52:10	702151.03	585531.68	C08
06/18/10	7:59:45	697820.76	584745.45	C04
06/18/10	9:19:33	704034.48	586880.79	C09
06/18/10	10:08:37	704893.68	587093.44	C10
06/18/10	11:29:26	706533.15	587661.03	D01
06/18/10	15:09:06	707774.71	588754.46	D01
06/18/10	10:45:04	706191.33	587448.91	C11
06/19/10	8:53:09	707484.92	588482.86	D01
06/19/10	10:40:02	710803.34	589415.48	D04
06/19/10	12:24:00	712766.58	590305.61	D06
06/19/10	12:42:51	708265.85	589239.54	D02
06/19/10	13:56:15	711927.77	589930.71	D05
06/19/10	15:45:04	716259.31	592235.87	D09
06/20/10	10:13:03	712411.49	592235.87	D06
06/20/10	11:53:09	715213.21	592235.87	D08
06/20/10	14:26:25	716322.12	592235.87	E01
06/20/10	16:56:54	720753.85	592235.87	F02
06/21/10	10:00:31	721143.27	592235.87	F02
06/21/10	14:28:18	724343.45	592235.87	G03
06/21/10	18:28:24	725397.61	592235.87	G04
06/22/10	9:05:16	725170.89	592235.87	H01
06/22/10	11:05:42	729737.75	592235.87	H05
06/22/10	13:10:39	732004.66	592235.87	H07
06/22/10	15:16:31	733552.04	592235.87	H09
06/22/10	16:23:42	725029.53	592235.87	H01a
06/23/10	6:31:53	734972.26	592235.87	H10
06/23/10	8:49:13	736048.20	592235.87	H11
06/23/10	16:35:15	695139.17	597733.81	A08
06/23/10	17:38:15	692989.88	598358.57	A05

Daily Horizontal Position Checks

Date	Time	Northing	Easting	Location
06/10/10	7:22:39	660438.94	579042.49	EM DOCK
06/10/10	20:34:48	660438.21	579042.26	EM DOCK
06/11/10	7:04:17	660438.64	579042.30	EM DOCK
06/11/10	18:05:36	660438.58	579042.17	EM DOCK
06/12/10	8:15:39	660438.64	579042.30	EM DOCK
06/12/10	16:55:44	660438.82	579042.53	EM DOCK
06/13/10	7:00:55	660438.82	579042.16	EM DOCK
06/13/10	16:32:49	660439.61	579042.25	EM DOCK
06/14/10	8:01:08	660439.06	579042.12	EM DOCK
06/15/10	7:01:56	660438.76	579041.98	EM DOCK
06/15/10	17:29:06	660438.64	579041.80	EM DOCK
06/16/10	7:04:21	660439.18	579041.65	EM DOCK
06/16/10	16:55:28	660438.82	579042.03	EM DOCK
06/17/10	7:02:21	660439.55	579042.21	EM DOCK
06/17/10	18:27:01	660439.06	579042.12	EM DOCK
06/18/10	7:05:51	660440.94	579040.12	EM DOCK
06/18/10	7:06:50	660439.06	579041.75	EM DOCK
06/18/10	16:34:23	733784.93	597070.46	CPG DOCK
06/19/10	8:18:22	733784.38	597071.07	CPG DOCK
06/19/10	16:35:07	733783.53	597071.16	CPG DOCK
06/20/10	7:13:15	733783.78	597070.93	CPG DOCK
06/20/10	17:11:27	733782.74	597070.98	CPG DOCK
06/21/10	8:10:05	733783.65	597070.75	CPG DOCK
06/21/10	18:45:27	733783.59	597070.65	CPG DOCK
06/22/10	7:35:51	733783.78	597070.79	CPG DOCK
06/22/10	19:29:29	733783.23	597070.89	CPG DOCK
06/23/10	6:26:58	733783.72	597070.84	CPG DOCK

Daily Vertical Tide Checks

Date	Time	Northing	Easting	Description	RTK	BOARD
06/10/10	9:10:40	695108.35	597797.17	PORT	2.44	2.50
06/10/10	14:10:37	695151.22	597782.76	PORT	-0.70	-0.65
06/10/10	20:03:14	695156.04	597815.80	PORT	4.45	4.50
06/11/10	8:00:13	695156.34	597801.21	PORT	3.33	3.40
06/11/10	13:34:21	695147.30	597790.21	PORT	-0.94	-0.90
06/11/10	17:35:42	695169.82	597801.70	PORT	2.95	2.95
06/12/10	8:48:13	695223.40	597739.17	PORT	3.60	3.65
06/12/10	11:13:23	695140.81	597776.80	PORT	1.93	1.90
06/12/10	16:17:28	695149.41	597785.68	PORT	-1.00	-0.90
06/13/10	7:29:06	695165.13	597757.11	PORT	2.35	2.40
06/13/10	8:59:39	695181.90	597828.48	PORT	3.85	3.85
06/13/10	16:09:04	695139.02	597812.46	PORT	-1.35	-1.30
06/15/10	7:33:47	695171.70	597745.36	PORT	-0.37	-0.30
06/15/10	11:20:23	695162.58	597797.53	PORT	4.10	4.20
06/15/10	16:54:10	695166.45	597793.91	PORT	-1.15	-1.10
06/16/10	7:31:54	695171.37	597810.01	PORT	-1.80	-1.75
06/16/10	12:03:41	695182.19	597825.94	PORT	4.10	4.10
06/16/10	16:13:39	695153.15	597809.21	PORT	0.12	0.10
06/17/10	8:18:29	695143.91	597805.14	PORT	-1.50	-1.50
06/17/10	12:43:18	702182.72	585768.44	PATH	3.81	3.76
06/17/10	17:53:00	695116.69	597815.47	PORT	-0.70	-0.60
06/18/10	7:46:52	695173.11	597819.15	PORT	-1.40	-1.35
06/18/10	13:21:45	702204.73	585774.18	PATH	4.20	4.19
06/18/10	16:42:24	733783.84	597070.79	CPG	3.00	2.90
06/19/10	8:20:04	733784.26	597071.07	CPG	-1.16	-1.17
06/19/10	12:36:16	702182.09	585776.25	PATH	1.90	1.95
06/19/10	16:35:20	733783.41	597071.16	CPG	4.20	4.10
06/20/10	7:36:19	720788.19	592072.15	NUTLEY	0.40	0.35
06/20/10	12:34:11	720728.52	592061.14	NUTLEY	-0.10	-0.15
06/20/10	16:59:33	720740.24	592047.25	NUTLEY	4.70	4.60
06/21/10	8:09:03	733783.84	597070.51	CPG	1.10	1.08
06/21/10	14:23:04	720829.87	592107.87	NUTLEY	1.10	1.16
06/21/10	18:45:27	733783.59	597070.65	CPG	3.81	3.73
06/22/10	7:35:51	733783.78	597070.79	CPG	2.61	2.59
06/22/10	12:34:10	733850.69	596945.27	CPG	-1.39	-1.46
06/22/10	19:29:29	733783.23	597070.89	CPG	4.27	4.26
06/23/10	6:26:58	733783.72	597070.84	CPG	3.48	3.51
06/23/10	9:55:28	733776.39	596976.44	CPG	1.38	1.41
06/23/10	16:33:47	695171.44	597798.42	PORT	2.95	3.00
06/23/10	17:59:38	695168.78	597814.41	PORT	4.12	4.10

APPENDIX 5

Portable Disk including:

Survey Report,
AutoCad Drawings,
Hypack Files,
Field Notes,
ASCII Data,

BATHYMETRIC SURVEY

Field Report

SITE VISIT
SUMMARY OF FINDINGS
JUNE 8-11, 2010
AND JUNE 23, 2010

LOWER PASSAIC RIVER, NEWARK, NJ

Prepared by:

AECOM
5757 Woodway, Suite 101 W
Houston, TX 77057

Amended June 29, 2010

BATHYMETRIC SURVEY
FIELD REPORT
SITE VISIT
SUMMARY OF FINDINGS
JUNE 8-11, 2010
AND JUNE 23, 2010

PROJECT:

Lower Passaic River Restoration Project, AECOM Environment, Project Number 60139067

PURPOSE:

The AECOM Houston office was tasked with providing oversight for a multibeam and single beam hydrographic survey of the Lower Passaic River between river miles 0-14. The survey is conducted periodically in support of the ongoing Lower Passaic River Study Area (LPRSA) Remedial Investigation / Feasibility Study. Two main objectives were identified for the June 8-11, 2010 site visit. The first objective was confirmation that Gahagan & Bryant Associates, Inc. (GBA) equipment setup and calibration was consistent with industry procedures and standards. The second objective was the oversight of survey data collection between river miles 0-2. A second site visit was conducted on June 23, 2010 to provide survey oversight between river miles 13-14.

SURVEY LOCATION:

The survey location is comprised of an area of Newark Bay and the Lower Passaic River between river miles 0-14, Newark, NJ.

Multibeam patch test conducted in Newark Bay - (approximate location Lat. 40° 39’ 38”N, Long . 074° 08’ 46”W). See Process section. June 8, 2010, Tuesday

Performance test conducted in Newark Bay - (approximate location Lat. 40° 39’ 38”N, Long . 074° 08’ 46”W). See Process section. June 8, 2010, Tuesday

EQUIPMENT AND SOFTWARE:

The equipment used aboard the Gahagan & Bryant Associates Inc. (GBA) 25’ survey vessel SeaFix during the site visit, patch test and performance test was consistent with that listed in the

company's Technical Proposal dated April 29, 2010. The equipment included the Reson 8101 multibeam echosounder, Odem Mark III depth recorder, Trimble RTK positioning system, Applanix-TSS POS-MV and HYPACK/HYSWEEP data collection/processing software. In addition an Applied Microsystems velocity probe was used for sound velocity measurements and a disc type aluminum plate was used for bar check calibrations. GBA personnel included Ed DeAngelo, Travis Schmidt, Paul Seaboldt and Blair Carlson.

PROCESS:

First Site Visit (June 8-11, 2010)

June 8, 2010, Tuesday, 0700-1800
– GBA performed a patch test in Newark Bay which consisted of a small survey of a series of lines designed to reveal residual biases in pitch, roll, yaw and latency. The offsets and delays that were determined for each of the biases were then used to correct and calibrate the multi-beam system. Static offset measurements and checks were made in Baltimore, MD prior to mobilizing and once again when the vessel was on site in Newark, NJ. The weather conditions were good with temperatures at 65°-70°, clear skies and calm seas during the testing process.

– A quality assurance performance test was conducted in Newark Bay in the general vicinity of the patch test. Separate multibeam and single beam surveys were run and the overlapping data compared to evaluate the multibeam data quality. This check provided a statistical estimate of the data accuracy. The quality control calibration and performance test were processed and adjusted aboard the survey vessel prior to any multibeam data collection.

June 9, 2010, Wednesday, 0700-1900,
– Verify horizontal and vertical control with both Trimble and Leica positioning systems.

– Install and level the tide staff at tide station "Port" located at approximate river mile 2.2.

– Begin collecting multibeam data and single beam cross section and longitudinal line data between approximate river miles -0.25 - 0.5.

June 10, 2010, Thursday, 0700-2030
– Collect multibeam data and single beam cross section and longitudinal line data between approximate river miles 0.5 - 1.5.

June 11, 2010, Friday, 0700-1830
– Collect multibeam data and single beam cross section and longitudinal line data between approximate river miles 1.5 - 2.3.

Second Site Visit (June 23, 2010)

June 23, 2010, Wednesday, 0630-1930
– Collect multibeam data and single beam cross section and longitudinal line data between approximate river miles 13-14.

– Establish tide gauge offset points at approximate river mile 0.9 and 14. The offset points will be used in leveling tide gauge stilling wells.

– A patch test was performed at the approximate location of the June 8, 2010 test. The resulting residual biases calculated were identical to those generated during the first site visit.

– A quality assurance performance test was conducted at the approximate location of the June 8, 2010 test. The results of this test were not available at the time this report was written. GBA will provide the results in their survey report. Both Trimble and Leica positioning systems were used during the test to provide a check of the horizontal and vertical control system.

– Collect multibeam data and single beam cross section and longitudinal line data in the area of river mile 2. A portion of this reach near the river bank had been to shallow due to low tide conditions while surveying on June 11, 2010.

GBA SURVEY VESSEL SEAFIX
WITH MULTIBEAM DOCKED AT THE
ELIZABETH CITY MARINA

MULTIBEAM SONAR HEAD
MOUNTED ABOARD THE SEAFIX

BARCHECK BEING CONDUCTED ABOARD THE SEAFIX ON THE LOWER PASSAIC RIVER

TIDE STAFF “PORT” AT APPROXIMATE RM 2.2 ON THE LOWER PASSAIC RIVER

TIDE GAUGE STILLING WELL OFFSET POINT AT APPROXIMATE RIVER MILE 0.9 ON THE LOWER PASSAIC RIVER

RESULTS:

The quality assurance performance test conducted during the June 8-11, 2010 site visit yielded a mean difference of 0.04' between the multi-beam survey and the single beam survey run over the same location. This compares favorably with the U.S. Army Corps of Engineers, EM 1110-2-1003, Chapter 3, Table 3.1, Hard Bottom Material classification of ± 0.1' maximum allowable bias.

The 95% confidence level in 60' of water was 0.55' which is less than the ± 1.0' maximum allowable difference as indicated in the U.S. Army Corps of Engineers, EM 1110-2-1003, Chapter 3, Table 3-1 under the Hard Bottom Material classification for depths greater than 40'.

The results of the quality assurance performance test conducted during the June 23, 2010 site visit were not available at the time this report was written. GBA will provide the results in their survey report.

Horizontal position checks were performed at the dock at the beginning and end of each day to reveal any potential positioning errors.

A tide staff was installed on June 9, 2010 at river mile 2.2. The station designated "PORT" was established as a check for the RTK tides used while surveying this portion of the river. Checks were made against the staff a minimum of twice per day. Additionally a point designated "CPG1" was established prior to the second site visit on the steel sheet pile bulkhead adjacent to a floating dock at the Cooperating Parties Group (CPG) offices (approximate river mile 13.4). Point "CPG1" was used as a reference mark for measuring to the water surface and provided a check for the RTK tides used while surveying in this area of the river.

During both site visits single beam bar checks were performed within the project area as a method of calibration for acoustic depth measurements. A difference between the bar depth and an echosounder depth represented corrections that needed to be made to subsequent recorded depths. Bar checks were performed at a minimum of twice per day. Checks were made at 5' depth intervals. A multibeam bar check was conducted in Baltimore, MD prior to mobilizing and once again when the vessel was on site in Newark, NJ.

Sound velocity profiles were collected during both site visits using a velocity probe to measure changes in the water column such as temperature and salinity that affect data quality. Velocity profiles were taken in the work area at the beginning of data collection on each reach. This resulted in multiple velocity profiles being collected each day.

CONCLUSION:

The equipment calibration and procedures used by GBA during both site visits substantially conforms to the applicable accuracy standards, quality control and quality assurance requirements as listed in the U.S. Army Corps of Engineers, EM 1110-2-1003, Chapter 3, Table 3-1. The maximum allowable biases listed in the results section of this report are from the Navigation & Dredging Support Surveys Hard Bottom Material Classification (Table 3.1) which generally has the most stringent accuracy requirements.

CONTACT:

Questions regarding the technical aspects of this report should be addressed to:

AECOM
5757 Woodway, Suite 101W
Houston, TX 77057

Attention: John Gaskin
Telephone: 713-267-3247
Fax: 713-267-3295
Email: john.gaskin@aecom.com

Laura Kelmar
AECOM Project Manager
2 Technology Park Drive
Westford, MA 01886-3140

Subject: Review of Hydrographic Survey Report prepared by Gahagan & Bryant Associates, Inc (GBA) for Spring 2010, Lower Passaic River, Newark, NJ, submitted September 30, 2010. Items marked with an asterisk and in italics indicate the action GBA took to resolve the deficiency.

PURPOSE:

Quality Assurance review of the report referenced above to ensure accurately detailed daily field operations and data processing procedures.

BACKGROUND:

GBA performed a multi-beam and single beam hydrographic survey of the Lower Passaic River, in the vicinity of Newark, NJ between river miles 0-14 during the spring of 2010. These surveys are conducted periodically in support of the ongoing Lower Passaic River Study Area (LPRSA) Remedial Investigation / Feasibility Study. I was present for two separate site visits during the duration of the survey operations resulting in the report referenced above. My initial site visit included the survey dates of June 8-11, 2010 and my final visit included the survey date of June 23, 2010. I was present during these site visits to observe and confirm that GBA survey equipment setup and calibration was consistent with industry procedures and standards and to provide survey oversight between river miles 0-2 and 13-14.

RESULTS:

- The equipment listed in the report by GBA for the multi-beam and single beam hydrographic survey is consistent with the equipment listed in the company's Technical Proposal dated April 29, 2010 and with that used during my site visits.

- The survey report states that sound velocity profiles and vertical positioning checks were made at the beginning, midpoint and end of the survey day as well as horizontal positioning checks at the beginning and end of each survey day. There exist some instances where these checks were not listed in the Daily Multi-Beam Survey Log (see logs from June 9, 11, 13, 21, 23 for sound velocity profiles, June 8-10, 19, 21, 22 for horizontal positioning checks and June 18, 21, 22 for vertical positioning checks).
  ** Tables listing horizontal position checks, vertical tide checks and sound velocity profiles have been added as pages 201-203 of the revised September 30, 2010 report.*

- The electronic copy of the Daily Multi-Beam Survey Log for June 22, 2010, page 10 of 14, is not included in the report.
  ** This page is now included in the revised September 30, 2010 report.*

- The Daily Multi-Beam Log for June 22, 2010, page 11, indicates the multi-beam sensor head hit a rock, as a result tests were run to determine if any changes had occurred to the system. There appears to be no reference to these tests in the report.
  ** This is addressed on page 21 of the revised September 30, 2010 report under Section 6, Daily Overview of Survey Operations (June 22, 2010).*

- The quality assurance performance tests were conducted on June 8, 17, and 23. The results of each test shown on pages 15-17 of the report are listed below:

  The performance test conducted on June 8 yielded the following results: Maximum outlier = 0.64', Mean difference = - 0.08'and 95% Confidence = 0.43'.

  The performance test conducted on June 17 yielded the following results: Maximum outlier = 0.76, Mean difference = -0.07'and 95% Confidence = 0.44'

  The performance test conducted on June 23 yielded the following results: Maximum outlier = 0.85', Mean difference = -0.03' and 95% Confidence = 0.44'

  The maximum allowed tolerances as indicated in the U.S. Army Corps of Engineers Standards, EM 1110-2-1003, Chapter 3, Table 3-1 under the Hard Bottom Material classification are:
  Maximum outlier = 1.0'
  Mean difference = < 0.1'
  95% Confidence = ± 1.0'

  The maximum allowed tolerances for the Soft Bottom Material classification are:
  Maximum outlier = 1.0'
  Mean difference = < 0.2'
  95% Confidence = ± 2.0'

The results of each of the three performance test conducted by GBA are within the tolerances allowed by the USACE standards.

- The raw data was reviewed for obvious outliers then processed through all phases with Hysweep software. There is no specific information detailing each phase of this processing.
  ** A more detailed explanation of the processing phases has been added on pages 8-9 of the revised September 30, 2010 report under Section 4, Overview of Office Processing Procedures.*

- GBA overlaid single beam cross section data with multi-beam data to ensure the accuracy of the data sets. There is no mention of the results of the comparison.
  ** The comparison between single beam cross section data and multi-beam data is addressed on page 19 of the revised September 30, 2010 report under Section 5, Single Beam Cross Check Lines.*

- The report states once the multi-beam data was edited and verified it was formulated into final products, such as contours and binned data. There appears to be no mention of the specifics regarding bin size and contour intervals and how they were generated in this section.
  ** The binned data sizes and contour interval are listed on page 9 of the revised September 30, 2010 report under Section 4, Overview of Office Processing Procedures.*

CONTACT:

Questions regarding the technical aspects of this review should be addressed to:

AECOM
5757 Woodway, Suite 101W
Houston, TX 77057

Attention: John Gaskin
Telephone: 713-267-3247
Fax: 713-267-3295
Email: john.gaskin@aecom.com